Programme Outcomes - UG

The Undergraduate programme is spread over six semesters and offers twenty-six courses,focusingon the academic growth of students.

Arts/ Science/ Commerce

The Undergraduate Arts / Science/ Commerceprogrammes are aimed at providing students an in-depth studyto comprehendconcepts and theories,andto equip them with basic knowledge for their progression into higher education and/or greater employability.The objective is to enable them to:

- *Demonstrate comprehensive knowledge and understanding of one or more disciplines.*
- *Develop inter-disciplinary analytical skills and critical thinking.*
- *Develop Language Proficiency and Communication Skills*
- *Express thoughts and ideas effectively both in oral and written form*
- *Analyze, synthesize and integrate knowledge.*
- *Become employable in government and non government organizations.*
- *Seek employment in high-level positions in a company, as well as have the competency to pursue higher education*
- *Understand the factors that propel change in society*
- *Be actively involved in social and professional services at the local, national and global levels.*
- *To introduce the discipline to students from diverse backgrounds/ trainings and capabilities.*
- *To initiate the students into open-mindedand progressive ways of thinking.*
- *To provide a foundation for other more detailed and specialized courses in the chosen discipline*

PSO/CO for UG courses in Science, Arts and Commerce

B.Sc. BOTANY HONOURS

Programme Objective:

The most important objective of the programme B.Sc. Botany honours is to understand the scope and significance of the discipline. To develop interest and curiousity towards plants and other life forms. This aims to develop ability in students about the branches and interaction of the plants with microorganisms and other components of environment. The objective is also to equip the students with the knowledge of evolution, development and importance of plants for human kind, with the application of current robust technologies for deciphering the hidden facts and figures related to the plants.

Programme Specific Objective:

The objective of the course is to develop skills in students to be able to identify and name the plants. They could gain and use the knowledge in the current scenario of development in science and technology to get better critical thinking: to include creative thinking, innovation, inquiry and analysis, evaluation of information. This will enable the students to develop scientific temperament after completion of the program. This will equip the students to do laboratory work from different equipments and they will be able to excel in the field related to scientific research in the area of Botany

Course Objective:

Core Course

CC101- To gain knowledge about the microbial world and the different class and examples of microorganisms' like- bacteria, viruses and algae. Their general characters, ecology, occurrence, classification and morphology. Various applications and uses in agriculture, environment, biotechnology and industries.

CC102- To learn that biomolecules like carbohydrates, proteins, nucleic acids and lipids are fundamental building blocks of living organisms. Their biosynthesis, properties and functions in an organism. The cell structure and subcellular components. Structural and chemical composition of the cell.

CC203- To gain knowledge about general characteristics (asexual and sexual fruiting bodies), life cycle of the fungi and their different class. Their ecology, occurrence, classification and morphology. Different related diseases and pathogenic fungi, control measures and Host- Pathogen relationships.

CC204- To learn about unifying features of archegoniates- the primitive plants and their transition to land habit. The study of bryophytes, pteridophytes and gymnosperms; general characteristics, classification, early land plants; classification (up to family), morphology, anatomy and reproduction in these organisms.

CC305- To gain knowledge about identification, classification, nomenclature; biosystematics, taxonomic hierarchy and systems of classification. To learn about families of angiosperms; floral and general characters. Parts of trees and phylogeny of angiosperms; the primitive and advanced terms and concepts of evolution.

CC306- To learn about different economically important classes of herb, shrubs and trees. Originof cultivated plants. The plant that are major cereal, legume, sugar, spices, and timber producers. The different parts of plants like oil seeds and their importance. The process of harvesting the products and economic uses.

CC307- To get acquainted with the basics of genetics and chromosomal inheritance. The unit of heredity; classical and modern concepts of genetics. Interactions and deviations from mendelism. The abnormalities, variations, molecular basis of mutations and their types.

CC408- To gain knowledge about macromolecules and the mechanisms of gene replication, mutation and expression. Also understanding how various cellular systems interact in terms of the way DNA, RNA and protein synthesis function. The different levels of regulation and maintenance of information in a cell.

CC409- To learn about distribution and abundance of plants, the effects of environmental factors upon their abundance, and the interactions among and between plants and other organisms. Abiotic components of earth’s environment like air, soil, water, temperature and fire etc. Ecosystems, ecotones and their interactions, energy production and energy flow among.

CC410- To get acquainted with plant anatomy of angiosperms. Plant Anatomy Applications in systematics, forensics and pharmacognosy. Study of tissue and cellular level of organization of stem, root and leaf in dicots and monocots. The adaptive and protective mechanisms and secretory systems in plants.

CC511- To gain knowledge about reproduction in angiosperms, organization and ultra-structure of the reproductive cells. Pollination and its types. Fertilization and formation of zygote and study of embryogenesis, its developmental stages. Seed structure, importance and dispersal mechanisms.

CC512- To learn about functioning and physiology of plants. Fundamental processes such as plant nutrition and essential nutrients, plant hormones and functions. Plant water

relations, nutrient uptake, physiology of flowering.

CC613- To gain knowledge about concept of metabolism, anabolic and catabolic pathways, regulation of metabolism, role of regulatory enzymes Mechanisms of signal transduction, nitrogen metabolism, lipid metabolism and ATP-Synthesis.

CC614- To get acquainted with the knowledge of genetic engineering, the manipulation of microorganisms, plants and animals at gene level to alter the character according to our need. The different modifying enzymes and catalysts for genetic engineering.. Plant tissue culture methods and applications of plant biotechnology.

Skill Enhancement Course

SEC I- To enhance the skills related to mushroom cultivation technology by hands-on experience in different research institutions /organization carrying out such production processes. Students learn the history of the cultivation techniques. Nutritional and medicinal value of edible mushrooms and Poisonous mushrooms. Cultivation, storage and nutritional properties of mushrooms.

SEC II- To enhance the skills in ethnobotany by visiting the traditional groups and tribal people of the local area and learn relevance of ethnobotany in the present context and ethnic groups of tribals and their lifestyle. To get well acquainted with the legal aspects, intellectual property rights and ethnobotany as an interdisciplinary science.

Discipline Elective Course

DSE I- To acquaint the students about different ecotourism, urban gardening, and various techniques of plant propagation. Floriculture, landscaping and garden designing. Preservation of post harvest crop plants, study of various diseases of fruits, vegetables and crop plants. Students visit to suitable locations to explore gardens, nurseries and horticultural fields.

DSE II- To acquaint the students with different techniques applied for cellular and molecular analysis of bio-molecules, cells and cellular components. The imaging of cells and tissue; separation and characterization of biomolecules like proteins, RNA and DNA through molecular techniques like electrophoresis. The statistical methods applied for data processing and analysis of biological data.

DSE III- To enable the students learn about the objectives of plant breeding, different methods of crop improvement to develop superior varieties. Quantitative inheritance in plants; concept, mechanism, examples. Crop improvement and breeding, role of mutations; polyploidy; distant hybridization and role of biotechnology in crop improvement.

DSE IV- To gain knowledge about basic concepts of research, general laboratory practices; data collection and methods of documentation of observations. Learn the basics of maintaining a laboratory record. Different methods to study plant cell/tissue structure. To learn the art of scientific writing and its presentation.

MATHEMATICS HONOURS

TITLE OF THE PAPER	Analytic Geometry 2D, Higher Algebra & Trigonometry
PAPER CODE	UCCMATH 101
CREDITS	6

On successful completion of this paper students will learn to:

(i) The concept of two dimensional plane and different rules of ellipse, parabola and hyperbola.

(ii) The primary objective of this course is to introduce the basic tools of geometric properties of different conic sections which are helpful in understanding their applications.

(iii)The basic trigonometric functions and their applications.

TITLE OF THE PAPER	Differential Calculus & Vector Calculus
PAPER CODE	UCCMATH 102 (A)
CREDITS	4

On successful completion of this paper students will learn to:

(i) The primary objective of this course is to introduce the basic knowledge of Partial differential equations, Curvature, Asymptotes, Maxima and Minima of two variables etc.

(ii) Also know the applications in real life problems.

(iii)Vector Calculus and its applications in different disciplines.

TITLE OF THE PAPER	Differential Calculus & Vector Calculus
PAPER CODE	UCCMATH 102 (B)
CREDITS	2

On successful completion of this paper students will learn to:

(i) This course aims at familiarizing students with MATLAB.

(ii) For plotting functions, animations and various applications of matrices.

(iii) Also, to carry out the sessions in computer lab to have a deep conceptual understanding to widen the horizon of students' self-experience.

TITLE OF THE PAPER	Differential Calculus & Coordinate Geometry 2D
PAPER CODE	UGEMATH 101
CREDITS	6

This course is offered to students who opt for Mathematics as their generic /elective.

(i) The objective of this paper is to enable the students with basic idea of dealing with calculus, vectors, co – ordinate geometry and real analysis.

(ii) Students will also learn about their applications in their respective fields like Statistics, Physics, Chemistry, Geology, CA/IT, Economics etc.

SEMESTER – II

TITLE OF THE PAPER	Analysis I
PAPER CODE	UCCMATH 203
CREDITS	6

On the completion of the course, students will be able to:

(i) The course will develop a deep and rigorous understanding of real line and of defining terms to prove the results about convergence and divergence of sequences and series of real numbers.

(ii) These concepts have wide range of applications in real life scenario.

(iii) Understand many properties of the real line and learn to define sequence in terms of functions.

(iv) Recognize bounded, convergent, divergent, Cauchy and monotonic sequences and to calculate their limit superior, limit inferior, and the limit of a bounded sequence.

(v) Apply the ratio, root, Alternating series and limit comparison tests for convergence and absolute convergence of an infinite series of real numbers.

TITLE OF THE PAPER	Integral Calculus & Analytic Geometry 3D
PAPER CODE	UCCMATH 204 (A)
CREDITS	4

On the completion of the course, students will be able to:

(i) Sketch curves in a plane using its mathematical properties in the different coordinate systems.

(ii) Apply derivatives in Optimization, Social sciences, Physics and Life sciences etc.

(iii) Compute area of surfaces of revolution and the volume of solids by integrating over cross-sectional areas.

TITLE OF THE PAPER	Integral Calculus & Analytic Geometry 3D
PAPER CODE	UCCMATH 204 (B)
CREDITS	2

On the completion of the course, students will be able to:

(i) Use MATLAB Code in Mathematical functions.

(ii) For plotting functions, animations and various applications of matrices.

TITLE OF THE PAPER	Integral Calculus, Vector Calculus & Trigonometry
PAPER CODE	UGEMATH 202
CREDITS	6

This course is offered to students who opt for Mathematics as their generic /elective.

(i) The objective of this paper is to enable the students with basic idea of dealing with calculus, vectors, co – ordinate geometry and real analysis .

(ii) Students will also learn about their applications in the respective fields like Statistics, Physics, Chemistry, Geology, CA/IT, Economics etc.

SEMESTER – III

TITLE OF THE PAPER	Theory of Real Functions
PAPER CODE	UCCMATH 305
CREDITS	6

On successful completion of this paper students will learn:

(i) This course will enable the students to learn to have a rigorous understanding of the concept of limit of a function.

(ii) It is a basic course on the study of real valued functions that would develop an analytical ability to have a more matured perspective of the key concepts of calculus, namely, limits, continuity, differentiability and their applications.

(iii)The geometrical properties of continuous functions on closed and bounded intervals.

(iv)The applications of mean value theorem and Taylor's theorem.

(v) Some of the families and properties of Riemann integrable functions, and the applications of the fundamental theorems of integration.

TITLE OF THE PAPER	Group Theory & Matrices I
PAPER CODE	UCCMATH 306
CREDITS	6

On successful completion of this paper students will learn to:

(i) The objective of the course is to introduce the fundamental theory of groups and their homomorphisms.

(ii) Recognize the mathematical objects that are groups, and classify them as Abelian, cyclic and permutation groups, etc;

(iii) Link the fundamental concepts of Groups and symmetrical figures;

(iv) Analyze the subgroups of cyclic groups;

(v) Explain the significance of the notion of cosets, normal subgroups, and factor groups.

(vi) The primary objective of this course is to introduce the basic properties of matrices to understand their linkage to the real-world problems.

TITLE OF THE PAPER	Differential Equations
PAPER CODE	UCCMATH 307
CREDITS	6

The course consists of integral and differential calculus.

(i) The great utility of the subject emanates from its use in solving differential equations.

(ii) This is a core course that will help the students in further studies involving Statistics and Mathematics.

(iii) The main objectives of this course are to introduce the students to the exciting world of Differential Equations.

(iv) This course is to teach students to form and solve partial differential equations and use them in solving some physical problems.

(v) Formulate, classify and transform partial differential equations into canonical form.

(vi) Solve linear and non-linear partial differential equations using various methods; and apply these methods in solving some physical problems.

TITLE OF THE PAPER	Logic and Sets
PAPER CODE	USECMATH 301
CREDITS	2

On successful completion of this paper students will learn to:

(i) This course aims at introducing the concepts of Boolean algebra.

(ii) The course discusses some important applications of Boolean algebra in real life situations.

(iii) After the course, the student will be able to understand the concepts of Boolean algebra and their applications;

TITLE OF THE PAPER	Real Analysis I, Group Theory & Differential Equations
PAPER CODE	UGEMATH 303
CREDITS	6

This course is offered to students who opt for Mathematics as their generic /elective.

(i) The objective of this paper is to enable the students with basic idea of dealing with Real Analysis, Set Theory, Real functions of two variables, their limit, continuity and differentiability, Abstract Algebra and Differential Equations.

(ii) Students will also learn about their applications in the respective fields like Physics, Chemistry, Geology, CA/IT, Economics etc.

SEMESTER – IV

TITLE OF THE PAPER	Analysis II
PAPER CODE	UCCMATH 408
CREDITS	6

On the completion of the course, students will be able to:

(i) To understand the extension of the studies of single variable differential and integral calculus to functions of two or more independent variables by which these concepts may be analyzed and visualized to have a better understanding.

(ii) The conceptual variations when advancing in calculus from one variable to multivariable discussions.

(iii) Inter-relationship amongst the line integral, double and triple integral formulations.

(iv) Applications of multi variable calculus tools in physics, economics, optimization, and understanding the architecture of curves and surfaces in plane and space etc.

TITLE OF THE PAPER	Mechanics I
PAPER CODE	UCCMATH 409
CREDITS	6

On the completion of the course, students will be able to:

(i) The course aims at understanding the various concepts of physical quantities and the related effects on different bodies using mathematical techniques. It emphasizes knowledge building for applying mathematics in physical world.

(ii) The significance of mathematics involved in physical quantities and their uses;

(iii) To study and to learn the cause-effect related to these; and

(iv) The applications in observing and relating real situations/structures.

TITLE OF THE PAPER	Ring Theory & Matrices II
PAPER CODE	UCCMATH 410
CREDITS	6

On the completion of the course, students will be able to:

(i) The primary objective of this course is to introduce the basic tools of Ring Theory of matrices to understand their linkage to the real-world problems.

(ii) The fundamental concept of Rings, Fields, subrings, integral domains.

(iii) The basic concepts of ring of polynomials and irreducibility tests for polynomials over ring of integers, used in finite fields with applications.

(iv) Appreciate the significance of unique factorization in rings and integral domains.

(v) Recognize consistent and inconsistent systems of linear equations by the row echelon form of the augmented matrix, using rank.

(vi) Find eigenvalues and corresponding eigenvectors for a square matrix.

TITLE OF THE PAPER	Graph Theory
PAPER CODE	USECMATH 402
CREDITS	2

On the completion of the course, students will be able to:

(i) This course aims at introducing the concepts of graph theory.

(ii) The course discusses some important applications of Boolean graph theory in real life situations.

(iii) Graphs, their types and its applications in study of shortest path algorithms.

TITLE OF THE PAPER	Real Analysis II, Complex Variable, Set Theory & Matrices
PAPER CODE	UGEMATH 404
CREDITS	6

This course is offered to students who opt for Mathematics as their generic /elective.

(i) The objective of this paper is to enable the students with basic idea of dealing with Real Analysis, Set Theory, Complex variables, Abstract Algebra and Differential Equations.

(ii) Students will also learn about their applications in the respective fields like Statistics, Physics, Chemistry, Geology, CA/IT, Economics etc.

SEMESTER – V

Title of Paper	Analysis III (Metric Space & Complex Analysis)
Course Code	UCCMATH 511
Credits	6

After successful completion of this course, students should have developed a clear understanding of:

(i) This course is to introduce the basic tools of complex numbers to understand their linkage to the real-world problems.

(ii) The course aims at providing the basic knowledge pertaining to metric spaces such as open and closed balls, neighborhood, interior, closure, subspace, continuity, compactness, connectedness etc.

(iii) Correlate these concepts to their counter parts in real analysis;

(iv) Appreciate the abstractness of the concepts such as open balls, closed balls, compactness, connectedness etc. beyond their geometrical imaginations.

(v) This course aims to introduce the basic ideas of analysis for complex functions in complex variables with visualization through relevant practicals.

(vi) Understand the significance of differentiability of complex functions leading to the understanding of Cauchy-Riemann equations.

Title of Paper	Linear Algebra
Course Code	UCCMATH 512
Credits	6

On successful completion, this course will enable the student to:

(i) Recognize consistent and inconsistent systems of linear equations by the row echelon form of the augmented matrix, using rank.

(ii) Find eigenvalues and corresponding eigenvectors for a square matrix.

(iii) Compute with the characteristic polynomial, eigenvalues, eigenvectors, and eigenspaces, as well as the geometric and the algebraic multiplicities of an eigenvalue and apply the basic diagonalization result.

(iv) Compute inner products and determine orthogonality on vector spaces, including Gram-Schmidt orthogonalization to obtain orthonormal basis.

Title of Paper	Number Theory
Course Code	UDSEMATH 501
Credits	6

After successful completion of this course, student should have developed a clear understanding of:

(i) The primary objective of this course is to introduce the basic tools of number theory to understand the real-world problems.

(ii) Apply Euclid's algorithm and backwards substitution to find greatest common divisor.

(iii) In number theory there are challenging open problems which are comprehensible at undergraduate level, this course is intended to build a micro aptitude of understanding aesthetic aspect of mathematical instructions and gear young minds to ponder upon such problems. Also, another objective is to make the students familiar with simple number theoretic techniques, to be used in data security.

Title of Paper	Probability & Statistics
Course Code	UDSEMATH 502
Credits	6

After successful completion of this course, student should have developed a clear understanding of:

- To make the students familiar with the basic statistical concepts and tools which are needed to study situations involving uncertainty or randomness. The course intends to render the students to several examples and exercises that blend their everyday experiences with their scientific interests.

- Distributions to study the joint behavior of two random variables.
- To establish a formulation helping to predict one variable in terms of the other, i.e., correlation and linear regression.

SEMESTER – VI

Title of Paper	Mechanics II
Course Code	UCCMAT H 613
Credits	6

On completion of the course, students should have achieved the following:

(i) The course aims at understanding the various concepts of physical quantities and the related effects on different bodies using mathematical techniques. It emphasizes knowledge building for applying mathematics in physical world.

(ii) The significance of mathematics involved in physical quantities and their uses;

(iii)To study and to learn the cause-effect related to these; and

(iv)The applications in observing and relating real situations/structures.

Title of Paper	Numerical Analysis
Course Code	UCCMATH 614
Credits	6

After successful completion of this course, student should have developed a clear understanding of:

(i) Some numerical methods to find the zeroes of nonlinear functions of a single variable and solution of a system of linear equations, up to a certain given level of precision.

(ii) Interpolation techniques to compute the values for a tabulated function at points not in the table.

(iii)Applications of numerical differentiation and integration to convert differential equations into difference equations for numerical solutions.

Title of Paper	Linear Programming
Course Code	UDSEMATH 603
Credits	6

After successful completion of this course, student should have developed a clear understanding of:

(i) This course develops the ideas underlying the Simplex Method for Linear Programming Problem, as an important branch of Operations Research. The course covers Linear Programming with applications to Transportation, Assignment Problem etc. Such problems arise in manufacturing resource planning and financial sectors.

(ii) Analyze and solve linear programming models of real life situations.

(iii) The graphical solution of LPP with only two variables, and illustrate the concept of convex set and extreme points. The theory of the simplex method is developed.

(iv) The relationships between the primal and dual problems and their solutions with applications to transportation, assignment problems etc.

Title of Paper	Special Functions
Course Code	UDSEMATH 604
Credits	6

After successful completion of this course, student should have developed a clear understanding of:

(i) The main objectives of this course are to introduce the students to the exciting world of Special Functions and their applications.

(ii) Solve first order linear differential equations of higher order using various techniques.

(iii) Also, get some knowledge of Laplace Transform etc.

STATISTICS HONOURS

TITLE OF THE PAPER	DESCRIPTIVE STATISTICS AND INDEX NUMBERS
PAPER CODE	UCCSTAT 101 A
CREDITS	4

On successful completion of this paper students will learn to:

- provide basic information about variables in a dataset and to highlight potential relationships between variables.
- The concept of index numbers will enable students to provide a value useful for comparing magnitudes of aggregates of related variables to each other, and to measure the changes in these magnitudes over time.

TITLE OF THE PAPER	DESCRIPTIVE STATISTICS AND INDEX NUMBERS
PAPER CODE	UCCSTAT 101 B
CREDITS	2

On successful completion of this paper students will learn to:

- provide basic information about variables in a dataset and to highlight potential relationships between variables.
- The concept of index numbers will enable students to provide a value useful for comparing magnitudes of aggregates of related variables to each other, and to measure the changes in these magnitudes over time.
- Various methods of graphical representation of statistical data.
- Construct of various index numbers including consumer price index.

TITLE OF THE PAPER	DIFFERENTIAL AND INTEGRAL CALCULUS
PAPER CODE	UCCSTAT 102
CREDITS	6

The course consists of integral and differential calculus.

- The great utility of the subject emanates from its use in solving differential equations. This is a core course that will help the students in further studies involving Statistics and Mathematics. Upon successful completion of this course, students will be able to
- differentiation and integration of complex functions
- evaluate definite/multiple integrals to find area between curves
- use the "D _ test" to find maximum, minimum and saddle points of multivariable functions.

TITLE OF THE PAPER	STATISTICAL METHODS
PAPER CODE	UGESTAT 101
CREDITS	6

This course is offered to students who opt for statistics as their generic elective.

The objective of this paper is to enable the students with basic idea of dealing with observations/data through the techniques of descriptive statistics including measures of central tendency, dispersion correlation and regression. Students will also learn about qualitative data using concept of attributes.

TITLE OF THE PAPER	PROBABILITY THEORY
PAPER CODE	UCCSTAT203 A
CREDITS	4

On the completion of the course, students will be able to:

- Learn the concept of various approaches of probability.
- Calculate probabilities using probability laws and theoretical results.
- Understand the concept of random variable and probability distributions.
- Identify an appropriate probability distribution for a given random variable and use its properties to calculate probabilities.
- Experience the real life application of the underlying probability distributions.

TITLE OF THE PAPER	PROBABILITY THEORY
PAPER CODE	UCCSTAT203 B
CREDITS	2

On the completion of the course , students will be able to:

- Fit appropriate probability distribution to the data.
- Calculate probabilities using probability laws and theoretical results.
- Identify an appropriate probability distribution for a given random variable and use its properties to calculate probabilities.
- Experience the real life application of the underlying probability distributions.

TITLE OF THE PAPER	MATRICES & LINEAR ALGEBRA
PAPER CODE	UCCSTAT 204
CREDITS	6

On the completion of the course, students will be able to:

- Do the elementary row operations for the matrices and systems of linear equations.
- Analyze the solution set of a system of linear equations.
- Express a system of linear equations in a matrix form.
- Generalize the concept of real/complex vector space to an arbitrary finite dimensional vector spaces.

- Understand the concept of linear transformations.

TITLE OF THE PAPER	INTRODUCTORY PROBABILITY
PAPER CODE	UGESTAT202
CREDITS	6

On the completion of the course, students will be able to:

- Learn the concept of various approaches of probability.
- Calculate probabilities using probability laws and theoretical results.
- Understand the concept of random variable and probability distributions.
- Identify an appropriate probability distribution for a given random variable and use its properties to calculate probabilities.
- Apply the Chebyshev's inequality and central limit theorem to calculate approximate probabilities for sample means.

Title of Paper	SAMPLING DISTRIBUTION
Course Code	UCCSTAT 305 A
Credits	4

On completion of this course the student will be able to :

- Determine the probability of an event based on data from a small group within a large population.
- Establish representative results of small samples of a comparatively larger population.
- Make inferences about the overall population.
- Apply the central limit theorem to calculate approximate probabilities for sample means and sample proportions.

Title of Paper	SAMPLING DISTRIBUTIONS
Course Code	UCCSTAT 305 B
Credits	2

On completion of this course the student will be able to:

- Experience the real life application of the underlying distribution of the population, the statistic being considered, the sampling procedure employed and the sample size used.
- Analytical considerations to be based on sampling distribution of a statistic rather than on the joint probability distribution of all the individual sample values.

Title of Paper	SURVEY SAMPLING
Course Code	UCCSTAT 306
Credits	6

On completion of this course the student will be able to :

- Draw valid conclusions about the larger group.
- Check the characteristics of population in less time through less effort and least cost.
- Determine the accuracy of research/survey result.
- Select members from a target population to be in a sample for a sample survey.

Title of Paper	DIFFERENTIAL EQUATIONS
Course Code	UCCSTAT 307
Credits	6

On completion of this course the student will be able to:

- This is a core course that will help the students in further studies involving Statistics and Mathematics.
- Upon successful completion of this course, students will be able to differentiation and integration of complex functions, evaluate definite/multiple integrals to find area between curves etc.

- The main objectives of this course are to introduce the students to the exciting world of Differential Equations.
- This course is to teach students to form and solve partial differential equations and use them in solving some physical problems.
- Formulate, classify and transform partial differential equations into canonical form.
- Solve linear and non-linear partial differential equations using various methods; and apply these methods in solving some physical problems.

Title of Paper	RESEARCH METHODOLOGY
Course Code	USECSTAT 301
Credits	2

On completion of this course the student will be able to:

- Explore the unknown and unlock new possibilities.
- Develop better insight into topic.
- Enhance the *Research* Quality ·
- Derive Better Solutions.
- Make Statistical decisions.

Title of Paper	STATISTICAL INFERENCE
Course Code	UGESTAT 303
Credits	6

On completion of this course the student will be able to:

- Gain insight regarding the population parameters from the observed data.
- Estimate the sample to sample variation or uncertainty.
- Provide estimates of unknown parameters from sample statistics.
- Quantify the chance of obtaining a particular random sample result if the null hypothesis were true.

Title of Paper	STATISTICAL INFERENCE
Course Code	UCCSTAT 408
Credits	6

On completion of this course the student will be able to:

- Gain insight regarding the population parameters from the observed data.
- Estimate the sample to sample variation or uncertainty.
- Provide estimates of unknown parameters from sample statistics.
- Make an inference about the population of interest on the basis of a random sample taken from that population.
- Hypothesize various advanced statistical techniques for modeling and exploring practical situations.

Title of Paper	LINEAR MODELS
Course Code	UCCSTAT 409 A
Credits	4

On completion of this course the student will be able to :

- Develop a deeper understanding of the linear regression model.
- Define the explanatory variable as the independent variable (predictor), and the response variable as the dependent variable (predicted).
- When describing the association between two numerical variables, evaluate
  - direction: positive ($x \uparrow, y \uparrow$), negative ($x \downarrow, y \uparrow$)
  - form: linear or not
  - strength: determined by the scatter around the underlying relationship.
- Define correlation as the linear association between two numerical variables.
  - Note that a relationship that is nonlinear is simply called an association.
- Recall that correlation does not imply causation.
- Define the least squares line as the line that minimizes the sum of the squared residuals, and list conditions necessary for fitting such line:

(1) linearity,

(2) nearly normal residuals,

(3) constant variability.

Title of Paper	LINEAR MODELS
Course Code	UCCSTAT 409 B
Credits	2

On completion of this course the student will be able to :

- Plot the explanatory variable (x) on the *x-axis* and the response variable (y) on the *y-axis,* and fit a linear regression model

  $y = \beta_0 + \beta_1 x$

  where, β_0 is the intercept and β_1 is the slope.

  - Note that the point estimates (estimated from observed data) for β_0 and β_1 are b_0 and b_1, respectively.
- Define residual (e) as the difference between the observed (y) and predicted ($\hat{y}$) values of the response variable.

  $e_i = y_i - \hat{y}_i$
- Calculate the estimate for the slope (b_1) as

  $b_1 = r(s_y/ s_x)$

  where,

  r is the correlation coefficient,

  s_y is the standard deviation of the response variable, and

  $s_x$is the standard deviation of the explanatory variable.

Title of Paper	REAL ANALYSIS
Course Code	UCCSTAT 410
Credits	6

On completion of this course the student will be able to :

- Describe the fundamental properties of the real numbers that underpin the formal development of real analysis;
- Demonstrate an understanding of the theory of sequences and series, continuity, differentiation and integration;
- Demonstrate skills in constructing rigorous mathematical arguments;
- Apply the theory in the course to solve a variety of problems at an appropriate level of difficulty;
- Demonstrate skills in communicating mathematics.

Title of Paper	NUMERICAL ANALYSIS
Course Code	USECSTAT 402
Credits	2

On completion of this course the student will be able to:

- Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions to otherwise intractable mathematical problems.
- Apply numerical methods to obtain approximate solutions to mathematical problems.
- Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations.
- Analyse and evaluate the accuracy of common numerical methods.

Title of Paper	APPLIED STATISTICS
Course Code	UGESTAT 404
Credits	6

On completion of this course the student will be able to:

- Understand basic theoretical and applied principles of statistics needed to enter the job force.
- Communicate key statistical concepts to non-statisticians.

- Solve practical problems in today's data-centric world.
- Decide what data they need to collect, determine how to collect that data, and then analyze and interpret the data using statistical tools, algorithms, and software.
- Employ the correct analyses, and effectively present the results.

Title of Paper	DESIGN OF EXPERIMENTS
Course Code	UCCSTAT 511 A
Credits	4

After successful completion of this course, students should have developed a clear understanding of:

- The fundamental concepts of design of experiments.
- The concepts of completely randomized design, Randomized block design and Latin square design
- The concepts of balanced incomplete block design,.
- Total and partial confounded factorial design and identify the effects of different factors and their interactions and analyze factorial experiments.

Title of Paper	DESIGN OF EXPERIMENTS
Course Code	UCCSTAT 511 B
Credits	2

After successful completion of this course, students should have experience of:

- The applications of completely randomized design, Randomized block design and latin square design,
- The applications of balanced incomplete block design,
- Total and partial confounded factorial design and identify the effects of different factors and their interactions and analyze factorial experiments on real life data.

Title of Paper	STOCHASTIC PROCESS & QUEUING THEORY
Course Code	UCCSTAT 512
Credits	6

On successful completion, this course will enable the student to

- Understand about fundamentals concepts of stochastic processes and Use notions of long-time behaviour including transience,recurrence and equilibrium in applied situations.
- Understand about Markov processes , Markov chains,Stability of Morkov chains and Construct transition matrices for Markov dependent behaviour and summarize process information.
- Understand the principles and objectives of model building based on Markov Chains and Poisson processes.
- Understand the concept of Queuing systems , Random walk and Classical ruin problem.

Title of Paper	OPERATION RESEARCH
Course Code	UDSESTAT 501
Credits	6

After successful completion of this course, student should have developed a clear understanding of:

- The fundamental concepts of Operational Research Techniques.
- Concepts of Linear Programming.
- Concepts of Assignment Problem.

Title of Paper	TIME SERIES ANALYSIS
Course Code	UDSESTAT 502
Credits	6

After successful completion of this course, student should have developed a clear understanding of:

- The components and forecast values of a time series at future time points.
- The concept of Moving -average(MA) process, Autoregressive(AR) process of order and two.
- The concept of short term forecasting method :Brown's discounted regression ,Box-Jenkins metod and Bayesian forcasting .
- The concepts of Stationary time series: Weak stationarity,autocorrelation function and correlogram of moving average.

Title of Paper	MULTIVARIATE & NON PARAMETRIC METHODS
Course Code	UCCSTAT 613 A
Credits	4

On completion of the course ,students should have achieved the following:

- The understanding of basic concepts associated with Multivariate Normal Distributions and their properties with special emphasis on Bivariate Normal Distribution.
- Analyzing Multivariate data using data reduction techniques like Principal Component Analysis, Factor Analysis.
- Classification method namely Discriminant Analysis.
- Testing of hypothesis using Non-Parametric test like Median test, Run test ,Kruskal Wallis test ect.

Title of Paper	MULTIVARIATE & NON PARAMETRIC METHODS
Course Code	UCCSTAT 613 B
Credits	2

On completion of the course, students should have achieved the following:

- Analyzing Multivariate data using data reduction techniques like Principal Component Analysis, Factor Analysis.
- Testing of hypothesis using Non-Parametric test like Median test, Run test ,Kruskal Wallis test etc.
- Classification method namely Discriminant Analysis.

Title of Paper	STATISTICAL QUALITY CONTROL
Course Code	UCCSTAT 614
Credits	6

After successful completion of this course, student should have developed a clear understanding of:

- Statistical process control tools-control charts for variable, attributes.
- Statistical product control tools-sampling inspection plans.
- Overview of Six sigma.

Title of Paper	ECONOMETRICS
Course Code	UDSESTAT 603
Credits	6

After successful completion of this course, student should have developed a clear understanding of:

- The fundamental concepts of econometrics
- Specification of the model.
- Multiple Linear Regression.
- Multicollinearity , Heteroscedasticity and Autocorrelation

Title of Paper	DEMOGRAPHY & VITAL STATISTICS
Course Code	UDSESTAT 604
Credits	6

After successful completion of this course, student should have developed a clear understanding of:

- Distinction between Vital Statistics and Demography.
- To check the completeness of registration data using Chandrasekharan –Deming formula.
- Use Myers' and UN indices in evaluating age data.
- Use of Balancing Equations.
- Population Composition and Dependency Ratio.
- Basic measures of Mortality, Fertility, Life tables, their construction and uses, and Concept of Abridged life and their construction by Reed and Merrell method and Concept of Stable and Stationary Populations.
- Basic measures of Fertility and Measures of Population Growth.

PHYSICS HONOURS

PROGRAMME SPECIFIC OUTCOMES

Students graduating with the B.Sc. (Honours) Physics degree should be able to

- Acquire
  (i) a systematic and coherent understanding of the academic field of basic Physics in areas like Mechanics, Electricity and Magnetism, Waves and Optics, Thermal and Statistical Physics, Quantum Mechanics, Mathematical Physics, Electronics and their applications to other core subjects in Physics;
  (ii) knowledge and skills in areas related to their specialization area corresponding to elective subjects within the disciplinary area of Physics and current and emerging developments in the field of Physics.
  (iii)a wide ranging and comprehensive experience in physics laboratory methods in experiments related to mechanics, optics, thermal physics, electricity, magnetism, digital electronics, solid state physics and modern physics. Students should acquire the ability for systematic observations, use of scientific research instruments, analysis of observational data, making suitable error estimates and scientific report writing;

(iv) procedural knowledge that creates different types of professionals related to the subject area of Physics, including professionals engaged in research and development, teaching and government or public service;

- Demonstrate the ability to use skills in Physics and its related areas of technology for formulating and tackling Physics-related problems and identifying and applying appropriate physical principles and methodologies to solve a wide range of problems associated with Physics. Recognize the importance of mathematical modelling, simulation and computational methods, and the role of approximation and mathematical approaches to describing the physical world and beyond.
- Plan and execute Physics-related experiments or investigations, analyse and interpret data collected using appropriate methods, including the use of appropriate software such as programming languages and purpose-written packages, and report accurately the findings of the experiment while relating the conclusions/findings to relevant theories of Physics.

Demonstrate relevant generic skills and global competencies such as

(i) problem-solving skills that are required to solve different types of Physics related problems with well-defined solutions, and tackle open-ended problems that belong to the disciplinary area boundaries;

(ii) investigative skills, including skills of independent investigation of Physics related issues and problems;

(iii) communication skills involving the ability to listen carefully, to read texts and research papers analytically and to present complex information in a concise manner to different groups/audiences of technical or popular nature;

(iv) analytical skills involving paying attention to detail and ability to construct logical arguments using correct technical language related to Physics and ability to translate them with popular language when needed;

(v) ICT skills;

(vi) personal skills such as the ability to work both independently and in a group.

- Demonstrate professional behaviour such as -

Title of the Paper	**MATHEMATICAL PHYSICS-1**
Course code	PHYCC 101 A & PHYCC 101 B
Credits	4 +2
Total Hours	60 + 25

(i) b e i ng objective, unbiased and truthful in all aspects of work and avoiding unethical, irrational behaviour such as fabricating, falsifying or misrepresenting data;

(ii) the ability to identify the potential ethical issues in work-related situations;

(iii) be committed to the free development of scientific knowledge and appreciation

(iv) its universal appeal for the entire humanity;

(v) promoting safe learning and working environment.

After successful completion of the course the students are expected to:

CO1: Introduction to the idea of fields

CO2: How differential calculus is extension of vector calculus. Scope and application of vector calculus to fields.

CO3: Introduction to various 3D differential operators, their physical significance and form in various coordinate systems and hence applications to problems.

CO4: Introduction to integral vector calculus, theorems therein and their physical significance.

CO5: Learn differential equations of first order in different forms viz. exact differential, homogenous and equations reducible to homogenous, evaluation of integrating factor, proper substitution of complex problems etc.

CO6: Study to calculate complementary function (C,F.) and particular integral (P.I.) of second order differential equations and implement the acquired mathematical knowledge to frame and solve differential equations at different physical situations.

CO7: Familiarize with the mathematical tools of Wronskian, Constrained maximization, Lagrange's multipliers, existence and uniqueness theorems to solve initial value problems.

CO8: General introduction to scientific computing, error analysis, basic numerical methods and algorithms.

CO9: Understanding the fundamentals of C and C++ programming for applications in computing differential equations at different physical situations.

Title of Paper	**MECHANICS**
Course Code	PHYCC102A
Credits	3+1
Total Hours	49(Guided)+ 15 (Unguided)

On successful completion of the course students are expected to have understood

CO1: conservation laws of linear momentum, impulse, variable mass system, motion of rocket and their applications to basic problems.

CO2. inertia and learned to calculate moment of inertia of various rigid bodies.

CO3: central force motion through energy equation and energy diagram , and to apply Kepler's law to describe the motion of planets and satellite in circular orbit, through the study of law of Gravitation.

CO4: the fundamentals of harmonic oscillator model, including damped and forced oscillators, and grasp the significance of terms like quality factor and damping coefficient

CO5: the basics of material properties like, elasticity, elastic constants and their relation, torsion of a cylinder and torsional rigidity, and to learn Poiseuille's equation for flow of a liquid through a capillary Tube.

CO6: that how fictitious forces-centrifugal and Coriolis force arise in a non-inertial frame.

CO7: the fundamentals of different types of frames of references and transformation laws-
both Galilean and Lorentz transformation; origin of fictitious forces-centrifugal and coriolis force arise in a non-inertial frame.

CO7: Basic concepts of special theory of relativity and its applications to understand length contraction, time dilation, relativistic addition of velocities, conservation of momentum and variation of mass, relativistic momentum, relativistic energy, and mass energy relation.

Title of the paper	**ELECTRICITY AND MAGNETISM**
Course Code	**CC 203 A**
Credits	**3+1**
Total hours	**51**

Title of Paper	**MECHANICS (PRACTICAL)**
Course Code	PHYCC102B
Credits	2
Total Hours	36

On successful completion of the course students are expected to have understood

CO1: Use of Vernier callipers, screw gauge and travelling microscope, and necessary precautions
during the different experiments.

CO2: Basics about the errors, their propagation and recording in final result up to correct significant digits.

CO3: The linearization of data and the use of slope and intercept to determine unknown quantities.

CO3: Way of writing of scientific laboratory reports, which may include theoretical and practical significance of the experiment performed, apparatus description, relevant theory, necessary precautions to be taken during the experiment, proper recording of observations, data analysis, estimation of the error and explanation of its sources, correct recording of the result of the experiment

After successful completion of the course the students are expected to:

CO1: Understand the application of Coulomb's law for the electric field, and also apply it to systems of point charges as well as line, surface, and volume distributions of charges,

CO2: Understand of the relation between electric field and potential, exploit the potential to solve a variety of problems, and relate it to the potential energy of a charge distribution, Multipole expansion and potential due to volume distribution of dipoles, Field energy density

CO3: Apply Gauss's law of electrostatics to solve a variety of problems, understand polarization, displacement vector, dielectric constant, polarizability, derivation and application of Clausius-Mossotti Relation and Langevin- Debye equation

CO4: Learn derivation and application of Poisson's equation and Laplace's equation to problems defined in Cartesian, spherical-polar and cylindrical coordinate systems

CO5: Learn the method of image charges to solve different problems on finding potential and field due to suitable charge distributions

CO6: Develop the understanding of properties of magnetic field such as curl, divergence and vector potential. Also understand the magnetic force in different situations.

CO7: Gain detailed knowledge of magnetic properties of matter.

CO8: Learn Complex number method to analyse different types of AC circuits and understand transient currents, learn skill of deriving the theories of different AC bridges and drawing their vector diagrams.

CO9: Learn three phase Ac generation and distribution systems.

CO10: Learn in detail about dead beat and ballistic galvanometer with theory and application.

CO11: Develop problem solving skills through two assignments, which are set of numerical problems that they have to solve on their own and they have to appear for a test based on those assignments.

Title of paper	Electricity and Magnetism
Course Code	PHY CC 306 B
Credits	2
Total Hours	30

After successfully completing the experiments the students are able to

CO1: Achieve the motor skills of joining various complex circuits with DC and AC.

CO2: Use of dead beat and ballistic galvanometer for different circuits and bridges.

Title of Paper	**WAVES AND OPTICS**
Course Code	PHYCC204A
Credits	3+1
Total Hours	54(Guided)+15 (Unguided)

On successful completion, this course will enable the student to

CO1: Recognize and use a mathematical oscillator equation and wave equation, and derive these equations for certain systems.

CO2: Apply basic knowledge of principles and theories about the behaviour of light and the physical environment to conduct experiments.

CO3: Understand the principle of superposition of waves and formation of standing waves.

CO4:Explain several phenomena we can observe in everyday life that can be explained as wave phenomena.

CO5:Use the principles of wave motion and superposition to explain the Physics of interference and diffraction.

CO6: Understand the working of selected optical instruments like biprism, interferometer, and diffraction grating.

Title of Paper	**WAVES AND OPTICS (PRACTICAL)**
Course Code	PHYCC204B
Credits	2
Total Hours	36

On successful completion, this course will enable the student to

CO1:Gain hands-on experience of using various optical instruments and making finer measurements of wavelength of light using Newton Rings experiment, Fresnel Biprism etc.

CO2:Learn about resolving power of optical.

CO3: Determine refractive index of material of prism using sodium light source and spectrometer through the concept of minimum deviation.

Title of the Paper	**MATHEMATICAL PHYSICS-II & COMPUTER LAB**
Course code	PHYCC 305 A & PHYCC 305 B
Credits	4 +2
Total Hours	40 + 25

After successful completion of the course the students are expected to:

CO1: Understanding Frobenius methods of different configurations to solve special functions viz. Legendre's , Bessel's , Hermite and Laguerre differential equations.

CO2: Familiarize with the terms of special functions i.e. Orthogonality condition, generating function and Rodrigue's formula to solve physical problems of projection operator, multipole charge expansion etc.

CO3: Learn the difference between discrete and continuous error functions in the context of error parameters i.e. mean deviation, mean absolute deviation and standard deviation.

CO4: Learning the basics of least-square fit for different experimental working variables representing physical quantities.

CO5: Ability to expand a function in the form of Fourier series and determine harmonic constants. This understanding is used to study the characteristics of different continuous time-signals.

CO6: To learn integrals in the form of gamma and beta function. The mastery of this topic is explored to solve problems of wave-packet distribution and perturbation theory.

CO7: Introduction to the numerical computer software Matlab. In this context students learn the basic properties and programming commands of the software.

CO8: Using Matlab students learn to verify and interpret different physical situations viz. Ohm's law, Hooke's law, mesh equations of electric circuits, coupled spring mass system etc.

CO9: Learn to apply the software Matlab to compute acoustical vibrations of damped and forced nature.

CO10: The ability to simulate and analyse different forms of continuous waves i.e. square waves, sine waves and saw-tooth waves

Title of the paper	THERMAL PHYSICS
Course code	CC 306 A
Credits	4(3+1)
Total hours	53

After completion of the course the students should be able to explain and describe

CO1: The analysis and synthesis of relation between heat and work and its application on heat engines. Understanding of second law of thermodynamics in elaborate way.

CO2: The concept of entropy with its different properties and study of third law of thermodynamics.

CO3: The ideas, properties and applications of thermodynamical potentials.

CO4: The mathematical and physical understanding of Maxwell's thermodynamical relations and developing the skill of solving problems involving different thermodynamical processes.

CO5: The idea of law of distribution of velocities of ideal gas, law of equipartition of energy and other related concepts.

CO6: Mean free path in gases and transport phenomena in ideal gas.

CO7: The properties of real gas. Derivation of Van der Waal's equation of state through Virial theorem. Joule-Thomson experiment.

Title of the paper	THERMAL PHYSICS
Course code	CC 306 B
Credits	2
Total hours	30

After completion of the experiments the students are

CO1: Developing the skill of handling and performing experiments using thermal instruments such as platinum resistance thermometer, lees disc, Searl's apparatus, thermocouple etc.

CO2: learning the skills of accurate measuements of temperatures and drawing related graphs.

Title of Paper	Digital Systems and Applications
Course Code	PHY CC307A
Credits	3+1
Total Hours	52

This is one of the core paper in physics curriculum, which introduces the concept of Boolean algebra and
the basic digital electronics. In this course, students will be able to understand the working principle of
Data processing circuits, Arithmetic Circuits, sequential circuits like registers, counters etc. based on flip-flops.
As the successful completion of the course, the student is expected to be conversant with the following:

CO-1. Secure first-hand idea of different components including both active and passive components to
gain an insight into circuits using discrete components and also to learn about integrated circuits.

CO-2 About analog systems and digital systems and their differences, fundamental logic gates,
combinational as well as sequential and number systems.

CO-3 Synthesis of Boolean functions, simplification and construction of digital circuits by employing
Boolean algebra.

CO-4 Sequential systems by choosing Flip-Flop as a building bock- construct multivibrators, counters to
provide a basic idea about memory including RAM, ROM and also about memory organization.

CO-5. To construct both combinational circuits and sequential circuits by employing NAND as building
blocks and demonstrate Adders, Subtractors, Shift Registers, and multivibrators using 555 ICs.

Title of the Paper	**MATHEMATICAL PHYSICS-III & COMPUTER LAB**
Course code	PHYCC 408 A & PHYCC 408 B
Credits	4 +2
Total Hours	60 + 25

CO-6. Learn about the architecture of 8085 microprocessor and various timing diagrams.

Title of Paper	Digital Systems and Applications Lab
Course Code	SPHY CC307B
Credits	2
Total Hours	30

The objective of the course to understand digital electronics practically and to get an idea to develop
digital circuit design for various purpose.

CO-1. Understand construction and use of CRO, and other experimental apparatuses used in the lab, including necessary precautions.
CO-2. Learn about the basic component of digital electronics and to circuit design.
CO-3. Hand on experience on Digital electronics.
CO-4. Idea of function of common electronic devices and different digital ICs.
CO-5. Design and development of digital circuits.
CO-6. Use of different types of digital ICs.

After successful completion of the course the students are expected to:
CO1: Learn about the complex numbers and their graphical representation; and to execute various algebraic operations like addition, subtraction, multiplication and division of complex numbers.
CO2: Learn to find roots of a complex numbers, complex exponential and complex logarithms.
CO3: Learn about functions of complex numbers and their properties such as analyticity, singularity, poles and their order etc.
CO4: Learn about applications of analytic functions and harmonic functions in various physical and mathematical problems through use of Cauchy-Riemann equations.

CO5:Learn about integral of complex function through parametric representations , Cauchy's integral theorem and Cauchy's integral formula.

CO6: Understanding Fourier integral theorem in complex and trigonometric form.

CO7: Familiarize with the mathematical operations of integral transforms i.e. Laplace transforms and Fourier transforms.

CO8: Learning the manifestation of integral transforms in consolation and integral semblance.

CO9: Understanding the meaning of 'Convolution' and deduction of Convolution theorem using Fourier and Laplace transformations.

CO10: Applications of integral transformations in different physical situations i.e. Heat flow equations, electrical circuits, differential equations and damped harmonic oscillators etc.

CO11: The ability to formulate Fourier complex transforms in Reciprocal lattice and vector translations in crystallography.

CO12: To analyse and interpret differential equations and Dirac-delta function using Matlab.

CO13: Computation of Fourier constants and special functions conditions i.e. orthogonality and generating function and simulate of experimental observations using method of least-square fit.

Title of Paper	**ELEMENTS OF MODERN PHYSICS**
Course code	**PHYCC409 A+B**
Credits	**4+2**
Hours	**60+30**

A

This course provides the students

CO1. The idea of inadequacies of classical mechanics and the historical development of Quantum aspects.

CO2. The meaning of wavefunction and probability interpretation associated with wavefunction.

CO3. Formulation of Schrodinger's equation and solution of its time independent part for selected problems: Potential step, Potential barrier and Particle in a box.

CO4. Connection between measurement results and the uncertainty relation.

CO5. Decay rates and lifetime of radioactive decays like alpha beta gamma decay. Neutrino, antineutrino, their properties and their role in explanation of beta decay.

CO6. Spontaneous and stimulated emission of radiation, optical pumping and population inversion.

CO7. Rate equation for three level lasers and their application in the study of Ruby laser and He-Ne laser.

B

This course provides the students

CO1. Idea of determination of Planck's constant by various technique: Black body radiation, LED's of different wavelength

CO2. Firsthand experience of using laser source for determination of circular aperture and wavelength of the source through diffraction grating.

Title of Paper	Analog Systems and Applications
Course Code	PHY CC410A
Credits	3+1
Total Hours	47

This course introduces the concept of semiconductor devices and their applications. It also emphasizes on understanding of amplifiers, oscillators, operational amplifier and their applications.

At the end of the course the student is expected to assimilate the following and possesses basic knowledge of the following.

CO-1. N- and P- type semiconductors, mobility, drift velocity, fabrication of P-N junctions; forward and

reverse biased junctions.

CO-2 Application of PN junction for different type of rectifiers and voltage regulators.

CO-3 To characterize various devices namely PN junction diodes, LEDs, Zener diode, solar cells, PNP and

NPN transistors. Also, construct amplifiers and oscillators using discrete components.

CO-4 NPN and PNP transistors and basic configurations namely common base, common emitter and

common collector, and also about current and voltage gain.

CO-5 Biasing and equivalent circuits, coupled amplifiers and feedback in amplifiers and oscillators.

CO-6 Operational amplifiers and knowledge about different configurations Demonstrate inverting and

non-inverting amplifiers using op-amps. Application of Operational amplifiers

Title of Paper	Analog Systems and Applications Lab
Course Code	SPHY CC410B
Credits	2
Total Hours	30

The objective of this course is to setup various types of laboratory experiments on analogue electronics
and understand some different concept of electronics.

COURSE LEARNING OUTCOME

Through the various experiments in the laboratory a student will learn

CO-1. Construction and use of specific analogue devices and experimental apparatuses used in the lab,

including necessary precautions.

CO-2. Hand on experience on analogue electronics related phenomena.

CO-3. Idea of signal processing application.

CO-4. Data analysis, error calculation and laboratory report preparation

Title of Paper	**QUANTUM MECHANICS AND ATOMIC PHYSICS**
Course code	**PHYCC511A+B**
Credits	**4+2**
hours	**60+30**

A

This course provides the students

CO1. Solution of time dependent Schrodinger equation and general idea of time evolution of a wavefunction, with specific cases: free particle and simple harmonic oscillator.

CO2. Eigenvalues and Eigenfunctions of a harmonic oscillator and probability interpretation of the wavefunction.

CO3. Particle confined in finite potential well is studied in detail.

CO4. Eigenvalues of angular momentum, its z component and space quantization.

CO5. Schrodinger equation is applied to hydrogen atom for determining the shape of the probability densities for ground & first excited states.

CO6. Splitting of spectral lines in the presence of magnetic and electric fields is studied: Zeeman effect and Stark effect.

CO7. Addition of angular momentum for low and high mass number elements is discussed.

B

This course provides the students

CO1. Solving Schrodinger equation using C programming.

Title of the Paper	**SOLID STATE PHYSICS & PHYSICS LAB**
Course code	PHYCC 512 A & PHYCC 512 B
Credits	4 +2
Total Hours	45 + 25

After successful completion of the course the students are expected to:

CO1: Familiarize with the basic concepts of crystallography viz. Bravais lattice, Reciprocal lattice, Miller indices, Brillouin zones, Lattice translation vectors etc.

CO2: Understanding diffraction of X-rays in crystals and interpretation of Bragg's law.

CO3: Learn the fundamentals of vibrations and phonon frequency in monoatomic and diatomic lattices.

CO4: Study the basics and mathematical interpretation of specific heat of solids stated by Dulong et al., Debye and Einstein.

CO5: Understanding magnetization of matter in the context of diamagnetic, paramagnetic and ferromagnetic materials.

CO6: Learn the classical Langevin's theories of diamagnetism and paramagnetics. Analyse and compare classical theory with Van- Vleck's theory of paramagnetism.

CO7: Understanding the fundamentals of electrons in periodic potential i.e. Bloch theorem, Kronig Penny Model, Band gap and effective mass. In this context students learn classification of materials on the basis of band theory.

CO8: Acquire knowledge of ferroelectric properties of materials and structural phase transitions.

CO9: Gain an understanding of piezoelectric, pyroelectric, ferroelectric and electrostrictive properties in crystals.

CO10: Learning underlying principles of superconductivity and expected to understand the related terminologies i.e. Meissner effect, types of superconductors, London equations, Penetration depth and BCS theory.

C11: Hands on training in practical experiments of viz. PE hysteresis loop of a ferroelectric crystal, calculation of the resistivity of a semiconductor by Four-probe method, determination of Hall coefficient of a semiconductor sample, Quincke's tube method to evaluate magnetic susceptibility of solids etc.

Title of Paper	**ADVANCED MATHEMATICAL PHYSICS**
Course Code	PHYDSE501A
Credits	3+1
Total Hours	45(Guided)+15(Unguided)

On successful completion, this course will enable the student to

CO1: Learning of the basic properties of the linear vector space such as linear dependence and independence of vectors.

CO2: Learn about change of basis, isomorphism and homomorphism, linear transformations and their representation by matrices.

CO3: Learning of the basic properties of matrices, different types viz., Hermitian, skew-Hermitian, orthogonal and unitary matrices and their correspondence to physical quantities, e.g, operators in quantum mechanics. They should also learn how to find the eigenvalues and eigenvectors of matrices.

CO4: Learning of basic properties of scalar , vector as tensor of rank zero and rank one repectively, and higher ranks of tensor.

CO5: learning of tensor as multilinear functionals on vector and its application in physical tensor e.g. inertia tensor.
CO5: learning of representation of different types of tensors in various kind of bases and corresponding reciprocal bases..

Title of Paper	**ADVANCED MATHEMATICAL PHYSICS (PRACTICAL)**
Course Code	PHYDSE501B
Credits	2
Total Hours	36

Student will learn to find numerically:

CO1: Multiplication of 3 X 3matrices

CO2: Eigenvalues and eigenvectors of 3 X 3 matrices

CO3: Orthogonal polynomials as eigenfunctions of Hermitian differential operators.

CO4: Determination of the principal axes of moment of inertia through diagonalization.

Title of the Paper	Classical Dynamics
Course Code	PHYDSE 502
Credits	5 + 1
Total Hours	75 + 15

After successful completion of the course, a student is expected to

CO1: Understand the fundamental concepts of analytical mechanics such as generalized coordinates, momenta, force, virtual work and use differential method of derivation of Lagrange's equations of motion.

CO2: Learn calculus of variations, application to different physical problems of maxima and minima such as equation of curve for minimum surface of revolution, Brachistochrone problem etc., Hamilton's principle, derivation of Lagrange and Hamilton equations, and the advantages of these formulations over Newtonian formalism, cyclic coordinates and the relation between symmetries and conserved quantities as well as the use of Poisson brackets.

CO3: Have imbibed ability to use the Lagrange's and Hamilton's equations to solve complex mechanical problems, understand Canonical transformation concepts and use it to solve problems, Hamilton-Jacobi method and its applications

CO4: Understand the intricacies of motion of particles in central force field, Rutherford Scattering and Scattering cross-section both in centre of mass and laboratory frames, critical thinking and problem-solving skills and to use phase space based arguments to achieve a qualitative understanding of the existing solutions.

CO5: Understand the fundamental concepts of special theory of relativity and their physical consequences, learn use of four-vectors such as 4-veocity, 4-momentum, 4-force and their use in covariant formulations of physical laws such as Maxwell's Field equations

CO6: Appreciate that the magnetic forces can be interpreted as relativistic effects and represent those parts of the transformed forces which depend on the velocity of the test charge relative to the observer, understand the transformation of different components of electric and magnetic fields under Lorentz transformation and their intricate relationship from the viewpoint of Special Relativity.

CO7: Develop problem solving skills through two assignments, which are set of numerical problems that they have to solve on their own and they have to appear for a test based on those assignments

Title of Paper	**ELECTROMAGNETICTHEORY**
Course code	**CC613A+B**
Credits	**4+2**
hours	**60+30**

A

CO1. Insights of Maxwells equations and their importance for the development of electromagnetic theory.

CO2. The understanding of propagation of electromagnetic radiation in unbounded media like vacuum, dielectric, conducting media.

CO3. The understanding of electromagnetic wave propagation in bounded media: reflection and transmission coefficients at plane interface in bounded media, evanescent wave.

CO4. Understanding polarization and the mechanism of polarization: Birefringence, Dichroism, Reflection and Scattering.

CO5. Production and detection of linearly, circularly and elliptically polarized light.

CO6. Development of wavefront in positive and negative uniaxial crystals.

CO7. Introduction to Optical Activity, Biot's Laws and Fresnel's Theory of optical rotation.

B

CO8. First hand idea of production of linearly polarized light by reflection and verification of Brewster's law.

CO9. Live view of optical rotation by sugar solution with varying concentrations.

Title of the Paper	Statistical Mechanics
Course Code	PHYCC 614 A
Credits	3+ 1
Total Hours	45 + 15

After successful completion of the course, a student is expected to

C01: Understand basic statistical methods and the concepts of microstate, macrostate, phase space, thermodynamic probability and partition function, use of Ensemble method and understand the use of Thermodynamic probability and Partition function for calculation of thermodynamic variables for physical system.

CO2: Learn application of the classical statistical mechanics to derive the law of equipartition of energy and specific heat, the Gibbs paradox and its resolution, learn derivation of Sackur – Tetrode formula and its meaning

CO3: Understanding of the combinatoric studies of particles with their distinguishable or indistinguishable nature and conditions which lead to the three different distribution laws e.g. Maxwell-Boltzmann distribution, Bose-Einstein distribution and Fermi-Dirac distribution laws of
particles and their derivation.

CO4: Understand the properties and Laws associated with thermal radiation, learn to apply the Fermi- Dirac distribution to model problems such as electrons in solids, apply the Bose-Einstein distribution to model problems such as blackbody radiation and Helium gas.

CO5: Understand the concept of Fermi energy and Fermi level, calculate the macroscopic properties of lightly and strongly degenerate Fermi gas, electron gas in metals and their properties.

CO6: Develop problem solving skills through two assignments, which are set of numerical problems that they have to solve on their own and they have to appear for a test based on those assignments

Title of the Paper	Statistical Mechanics
Course Code	PHYCC 614 B
Credits	2
Total Hours	30

CO1: In the laboratory course, with the exposure in computer programming and computational techniques, the student will be in a position to perform numerical simulations for solving the problems based on Statistical Mechanics

Title of Paper	**NUCLEAR AND PARTICLE PHYSICS**
Course code	**DSE603A**
Credits	**4+2**
Hours	**60 (Theory)+30 (Tutorial)**

The course provides the student with:

CO1. The basic idea of properties of the nucleus such as shape size and radius density magnetic moment, electric quadrupole moment etc.

CO2. Concept of binding energy, the various factors which determine the binding energy and dependence of binding energy per nucleon curve.

CO3. One complete unit is dedicated to radioactivity as it finds immense applications in modern medical applications, radio physics, etc.

CO4. Detailed idea of various types of ion accelerators, which serve as important tools in wide range of research areas.

CO5. Knowledge on the basic aspects of particle Physics – the fundamental interactions, elementary and composite particle.

CO6. Classifications of particles: leptons, hadrons (baryons and mesons), quarks, gauge bosons and quark model.

CO7. Understanding about the quantum numbers of particles, energy, linear momentum, angular momentum, isospin, electric charge, colour, strangeness, lepton numbers, baryon number and the conservation laws associated with them.

CO8. Application of conservation laws in interaction amongst various elementary particles to check whether the interactions are possible or forbidden.

Title of Paper	Physics of Devices and Instruments
Course Code	PHYDSE604 A
Credits	3+1
Total Hours	45

This paper is based on advanced electronics which covers the devices such as UJT, JFET, MOSFET, CMOS
etc. Digital Data parallel Communication . Asynchronous and synchronous transmission, and different encoding schemes. Standards are described along with the understanding of communication systems.
At the successful completion of the course the students are expected to master the following.

CO-1. UJT, JFET, MOSFETs
CO-2. Power Supply and the role of Capacitance and Inductance filters.
CO-3. Active and passive filters and various types of filters.
CO-4. Multivibrators using transistors.
CO-5. Concepts of parallel and serial communication and knowledge of Synchronous and Asynchronous
transmission.
CO-6. Basic idea of communication including different modulation techniques.

Title of Paper	LAB
Course Code	PHYDSE604 B
Credits	2
Total Hours	30

The main objective of this laboratory component of DSE-4, is to understand the working principle

of various types of electronic components and provide the core understanding of different amplifiers,
and oscillators.

CO-1 Learning of the construction and use of other experimental apparatuses used in the lab, including
necessary precautions.

CO-2. Practical experience of the characterizes of semiconductor devices like JFET, MOSFET and
different types of amplifiers and oscillator circuits.

CO-3. Review of experimental data analysis, writing of scientific laboratory reports including proper
reporting of errors

CO-4. Skills to realize the various network theorems.

Title of Paper	**MECHANICS**
Course Code	PHYGE101A
Credits	4
Total Hours	60

On successful completion of the course students would have understand

CO1: Concept of scalar, vector and their derivatives.

CO2: Ordinary differential equations and their solution

CO3: The motion of objects in different frame of references.

CO4: Laws of motion, reference frames, and its applications in problems like simple harmonic oscillator and damped oscillation.

CO5: The idea of conservation of angular momentum, central forces and the
effective potential, Kepler's laws of planetary motion.

CO6: The dynamics of rotating objects i.e. rigid bodies, angular velocity, the moment of inertia, parallel axis theorem, the inertia tensor, the motion of rigid bodies. non-inertial frames: pseudo forces, examples involving the centrifugal force. conservation laws of linear momentum, impulse, variable mass system, motion of rocket and their applications to basic problems.

CO7: the basics of material properties like, elasticity, elastic constants and their relation, torsion of a cylinder and torsional rigidity, and to learn Poiseuille's equation for flow of a liquid through a capillary Tube.
CO8: the fundamentals of different types of frames of references and transformation laws- both Galilean and Lorentz transformation
CO9: concepts of special theory of relativity and its applications to understand length contraction, time dilation, relativistic addition of velocities

Title of Paper	**MECHANICS (PRACTICAL)**
Course Code	PHYGE101B
Credits	2
Total Hours	36

On successful completion of the course students would have understand
CO1: Use of Vernier calipers, screw gauge and travelling microscope, and necessary precautions during the different experiments.
CO2: Basics about the errors, their propagation and recording in final result up to correct significant digits.
CO3: The linearization of data and the use of slope and intercept to determine unknown quantities.
CO3: Way of writing of scientific laboratory reports, which may include theoretical and practical significance of the experiment performed, apparatus description, relevant theory, necessary precautions to be taken during the experiment, proper recording of observations, data analysis, estimation of the error and explanation of its sources, correct recording of the result of the experiment.

Title of Paper	**WAVES AND OPTICS**
Course Code	PHYGE202A
Credits	4
Total Hours	60

On successful completion, this course will enable the student to

CO1: Recognize and use a mathematical oscillator equation and wave equation, and derive these equations for certain systems.

CO2: Apply basic knowledge of principles and theories about the behavior of light and the physical environment to conduct experiments.

CO3: Understand the principle of superposition of waves and formation of standing waves.

CO4:Explain several phenomena we can observe in everyday life that can be explained as wave phenomena.

CO5:Use the principles of wave motion and superposition to explain the Physics of polarization, interference and diffraction.

CO6: Understand the working of selected optical instruments like interferometer, and diffraction grating.

Title of Paper	**WAVES AND OPTICS (PRACTICAL)**
Course Code	PHYGE 204B
Credits	2
Total Hours	36

On successful completion, this course will enable the student to

CO1:Gain hands-on experience of using various optical instruments and making finer measurements of wavelength of light using Newton Rings experiment.

CO2:Learn about wave pattern through kundt's tube experiment and melde's experiment.

CO3: Determine refractive index of material of prism using sodium light source and spectrometer through the concept of minimum deviation.

Title of Paper	**ELECTRICITY AND MAGNETISM**
Course code	PHYGE303A
Credits	**4+2**
hours	**60+30**

The course provides the student with:

CO1. Basic understanding of vector calculus.

CO2. Introduction to electrostatics, Gauss's Theorem and Electric field and Potential.

CO3. Application to simple problems in Electrostatics, study of various charge distributions, capacitors etc.

CO4. Introduction to magnetic field, its energy density, different types of magnetic materials and the microscopic origin of magnetism.

CO5. Theoretical understanding of techniques to measure susceptibility and permeability of various types of magnetic materials.

CO6. Introduction to current electricity, electromagnetic induction.

CO7. Analysis of basic circuits like LC, LR and LCR, and their applications in devices like Transformer, three phase ac generator, Induction motor.

CO8. Introduction to thermoelectricity.

Title of Paper	**ELECTRICITY AND MAGNETISM**
Course Code	PHYGE303B
Credits	2
Total Hours	36

CO9. Training to set up various basic electrical circuits for measurement of high and low resistances, AC and DC voltages, comparison of capacitances.

CO10. Experimental study of the figure of merit of a Moving coil galvanometer.

Title of Paper	**THERMAL PHYSICS AND STATISTICAL MECHANICS**
Course code	GEPHY404A
Credits	4
Total Hours	60

This Course provides the student with:

CO1. Knowledge of thermodynamical systems, processes and also all the laws of thermodynamics, along with the knowledge of Carnot's cycle and theorem.

CO2. An idea of entropy along with its different properties.

CO3. The skill of solving problems on thermodynamical potentials and Maxwell's equations after deducing the equations.

CO4. Detailed study of the law of distribution of velocities and mean free path.

CO5. An understanding of transport phenomena on the basis of gas atoms and molecules.

CO6. Knowledge of thermal radiation along with the derivations of the concerned laws.

CO7. Origin of statistical Mechanics in Physics and general approach of Statistics.

CO8. An Introduction to statistical Mechanical concepts thereby establishing the correspondence between classical thermodynamics and the statistical approach.

CO9. Solution of Basic problems of classical and Quantum statistics.

Title of Paper	**THERMAL PHYSICS LAB**
Course code	GEPHY404B
Credits	2
Total Hours	30

This Course provides the student with:

CO1. Skill to handle work with thermal instruments.

CO2. Techniques of determination of different thermodynamical quantities through experiments and their graphs.

Title of the paper	**Renewable Energy and Energy Harvesting**
Course Code	**SEC-01**
Cerdits	**02**
Total Hours	**30**

Course objective: Since the course does not require a solid base in physics, the student is only expected to develop a understanding of renewable energy techniques

CO1: Qualitative ideas about Solar energy, Physical principle of conversion of solar energy into heat

energy, solar energy harvesting devices like solar cells, solar cookers, solar greenhouses etc CO2 Gets an idea about basic principle of wind energy conversion and basic components of wind energy conversion systems

CO3 Elementary idea of geothermal energy sources, its applications and method of obtaining energy from biomass

CO4. Know about other non-conventional energy sources like Ocean Thermal Energy Resources, Wind energy and Chemical energy resources

Title of the paper	**Weather Forecasting**
Course Code	**SEC-02**
Cerdits	**02**
Total Hours	**30**

Course objective: The aim of this course is not just to impart theoretical knowledge to the students but to enable them to develop an awareness and understanding regarding the causes and effects of different weather phenomenon and basic forecasting techniques

CO1: Qualitative ideas about atmospheric phenomena, principle of measuring the weather phenomena

CO2: To develop an understanding of Indian monsoon and its effect in Indian economy, tropical cyclones and naming of cyclones and its characteristics

CO3 Elementary idea of climate change and its current debate on international forum together its mitigation measures

CO4. Know about the types of weather forecasting and weather forecasting methods and use of satellite data in forecasting techniques

Department of Zoology

St. Xavier's College, Ranchi

PROGRAMME OUTCOME

This program is one of the most fundamental unit of basic sciences studied at undergraduate level. The program helps to develop scientific tempers and attitudes, which in turn can prove to be beneficial for the society since the scientific developments can make a nation or society to grow at a rapid pace. After studying this program, students will be more equipped to learn and know about different biological systems, their coordination and control as well as evolution, behavior and biological roles of the animals in the ecosystem. Moreover, they will be able to qualitatively and quantitatively analyse evolutionary parameters using various bioinformatics and computational tools used in modern sciences.

After the completion of this course, students have the option to go for higher studies, i.e., M. Sc. / Integrated MS Ph.D. and then do research work for the welfare of mankind. After higher studies, students can join as scientist or assistant professor or assistant teacher and can even look for professional job oriented courses, such as Indian Civil Services, Indian Forest Service, Indian Police Service etc.

Students enrolled in B.Sc. (Hons.) degree program in Zoology will study and acquire complete knowledge of disciplinary as well as allied biological sciences. At the end of graduation, they are likely to possess expertise which will provide them competitive advantage in pursuing higher studies from India or abroad; and seek jobs in academia, research or industries. Students will be able to define and explain major concepts in the biological sciences.

Course Outcomes

NON-CHORDATES I : PROTISTS TO PSEUDOCOELOMATES

Students will have learning about the basic taxonomy and systematics and classification of Protozoa, Porifera, Cnidaria and Helminth groups. They also will acquire knowledge about the biology of these taxonomic categories as well as about some acoelomate plus pseudocoelomate parasites for their life cycles, epidemiology, pathology, diagnosis, symptoms and treatments. They will also have knowledge about the basics of parasitology such as origin and evolution of parasitism, role of vectors, parasitoids, host-parasite interactions etc.

PERSPECTIVES IN ECOLOGY

Students will be understanding the various features and aspects of population ecology, community ecology and ecosystem ecology. They might have the knowledge about environmental biology in details. They will acquire knowledge about various tools and techniques of field ecology.

NON-CHORDATES II : COELOMATES

Students will be learning about classification of coelomate invertebrates and the structure, function plus biology of these taxonomic categories as well. They will understand about different vector born diseases and the related life cycles, epidemiology, pathology, diagnosis, symptoms and treatments. They will also know the basics of sericulture, apiculture and lac culture.

CELL BIOLOGY

Students will understand the structures, positions and functions of plasma membrane and all cellular organelles in details. They will acquire knowledge about chromosomes and cell divisions, both mitosis and meiosis. They will also know about cell signalling and cancers. They will know how to measure and stain different cell types.

DIVERSITY OF CHORDATES

Students will understand the classification, structure, function and biology of chordates of different taxonomic classes. They will also learn some special topics like zoogeography, metamorphosis, snake bites, migration of birds, parental care of amphibian, echolocation of mammals, poultry managements and different breeds of domestic animals.

PHYSIOLOGY: CONTROLLING AND COORDINATING SYSTEMS

Students will learn about basics of histology and tissue staining. They will also understand the physiology of muscles, nerves, reproductive systems and bone. They will learn details of endocrinology with classification of hormones, their biosynthesis, receptors, mode of molecular actions, physiological function, feedback controls and related disorders.

FUNDAMENTALS OF BIOCHEMISTRY

Students will understand the basic and fundamental biochemistry of carbohydrates, proteins, lipids and nucleic acids. They will also understand the nature, mechanism, and kinetics of

enzyme action. Some instrumentation such as microscopy, chromatography, electrophoresis, centrifugation, spectrophotometry etc will also be learnt.

COMPARATIVE ANATOMY OF VERTEBRATES

Students will have understood the structures of different systems such as, integumentary, skeletal, digestive, respiratory, circulatory, urinogenital, nervous and sensory organs in comparative way among the vertebrate groups.

PHYSIOLOGY: LIFE SUSTAINING SYSTEMS

Students will know the physiology of digestion, respiration, circulation, excretion and adaptation.

METABOLIC PROCESSES:

Students will understand the metabolism of carbohydrates, lipids and proteins in details. They will also learn about oxidative phosphorylation and redox reactions.

MOLECULAR BIOLOGY: Students will acquire knowledge about replication, transcription, translation, post transcriptional and post translational modifications, gene regulation, DNA repair mechanisms and various molecular tools and techniques like PCR, southern, northern and western blotting, recombinant DNA technology etc. They will also know the various tools and techniques related to bacterial microbiology. Some aspects of applied microbiology and diseases related to microbiology will also be learnt by the students.

PRINCIPLES OF GENETICS:

Students will learn the fundamental genetics like Mendelian and Non Mendelian inheritances, linkages, mutations, sex determination of various animals, extrachromosomal inheritances, transposable genetic elements etc. They will also understand the various aspects of biostatistics such as central tendency, t-test, chi-square, ANOVA, correlations and regression.

DEVELOPMENTALBIOLOGY:

Students will learn the different aspects of early, late and post embryonic developments. They will have the knowledge about implications of developmental biology in various fields, such as in teratogenesis, stem cell biology, in vitro fertilization, cryopreservation, cord blood transfusion etc.

EVOLUTIONARY BIOLOGY:

Students will know about population genetics, human evolution, various concepts about origin of species, extinctions, phylogenetic tree making. They will also understand few basic of bioinformatics.

ANIMAL BEHAVIOUR AND CHRONOBIOLOGY

Students will know in details about patterns of behaviours, survival strategies, social and cooperative behaviours, design of signals and chronobiology. They will also know to Construct ethograms.

DSE IMMUNOLOGY:

Students will develope knowledge about structures and function of immune cells, immunoglobulins, antigens and their interactions with antibodies. They will know about MHC molecules, cytokines, hyper sensitivity reactions and cellular mode of immunity development. They will know the immune diffusion technique and ELISA.

DSE – Wild Life Conservation

Student will be learning the various issues related to biodiversity loss and conservation as well as status, conditions and conservation of forest and wildlife. They will also be able to use various tools used in field biology

DSE – Animal Behaviour:

Students will learn details about animal behaviour, mechanism of physiological clock etc.

DSE Endocrinology: Students will learn details about structure and functioning of endocrine glands and hormones.

GE1 Animal Diversity:

Students will have learning about the basic taxonomy and systematics and classification of Animal Kingdom.

GE2 Human Physiology

Students will have a basic idea of Human Physiology.

GE3 Food Nutrition and Health

Students will acquire basic idea about food nutrition and health and hygiene.

GE4 Insect Vectors

Students will get basic introduction to Entomology and have idea about some of the common insect vectors.

SEC1 Sericulture

Student will learn about sericulture and its different perspectives.

SEC2 Aquarium and Fish Keeping

Students will learn about practices associated with aquarium and fish keeping.

Geology

- For B. Sc. Course:
  - In paper GLGCC101A (Earth system science) the students get acquainted with the entire solar system with special reference to earth, its magnetic field and convection current. The get concepts of plate tectonics and it relation to origin of continents, oceans and mountains and major events occurred since the origin of the earth.
  - In paper GLGCC102A (Mineral science) the knowledge of descriptive and optical mineralogy and crystallography is provided.
  - In paper GLGGE101A (Essentials of geology) the meaning and scope of geology and solar system is taught along with the overview to mineralogy and fossils.
  - The paper GLGCC203A (Elements of geochemistry) deals with chemistry of the earth with every layer of the earth and behaviour of the elements.
  - The paper GLGCC204A (Structural geology) the knowledge about the deformations over the earth since is origin is provided.
  - The paper GLGGE202A (Rocks and minerals) provides the knowledge about minerals and rocks, their physical and optical properties and their bases of classification.
  - The paper GLGCC305A (Igneous petrology) provides the knowledge about igneous rocks, their classification, texture, structures and the feature developed during their cooling and the representative rock types.

- In paper GLGCC306A (Sedimentary petrology) the students learn about the processes of sedimentation, particle-fluid interaction, the texture, structure and classification.
- In paper GLGCC307A (Palaeontology) the knowledge of the life of the geological past (vertebrates, invertebrates and palaeobatany) is taught.
- The paper GLGCCSE01 (Field geology) provides the field training (knowledge about toposheet and field equipments).
- The paper GLGGE303A (Fossils and their applications) provides the knowledge about fossils, their application and societal significance.
- In paper GLGCC408A (Metamorphic petrology) the formation of metamorphic rocks, its relation to tectonism and the representative rocks are discussed.
- In paper GLGCC409A (Stratigraphy: Principles and Indian stratigraphy) the principles, codes of stratigraphic nomenclature and Indian stratigraphy is discussed.
- In paper GLGCC410A (Hydrology), the basic concepts, groundwater flow and exploration, groundwater recharge and rainwater harvesting is taught.
- The paper GLGCCSE402 (Field geology-II) provides the knowledge about geological mapping and identification of structure and their stereoplots of structures.
- The paper GLGGE404A (Earth resources) provides the knowledge about earth's resources like energy, its sources and groundwater resources.
- The paper GLGCC511A (Economic geology) provides the knowledge about ores, its processes of formation and distribution in India.
- The paper GLGCC512A (Geomorphology) provides the knowledge about various features of the earth and role of natural agents in their formation.
- The paper GLGDSE501A (Exploration geology) provides the knowledge about mineral resources, its prospecting and exploration,

sampling techniques, drilling and reserve estimation and statistical analysis of data.

- The paper GLGDSE502A (Earth and climate) provides the knowledge about climate system, atmosphere, hydrosphere, biosphere and mechanism of monsoon.
- The paper GLGCC613A (Engineering geology) provides the knowledge about planning and designing of dams, tunnels bridges and geological considerations to avoid accidents and natural calamities.
- The paper GLGCC614A (Remote sensing and GIS) provides the knowledge about photo-geology, remote sensing, digital images processing and GIS.
- The paper GLGDSE603A (Fuel geology) provides the knowledge about hydrocarbon resources and their occurrences.
- The paper GLGDSE604A (Introduction to geophysics) provides the knowledge about physics of the earth like its magnetic and electrical field, geophysical methods of prospecting and use of anomalies in geophysical explorations.

B.A. Honours

ENGLISH HONOURS

Programme Specific Outcomes: The B.A. Honoursprogramme in English is a three-year course that aims at imparting to the students:

- a clear idea about the various movements and changes in the history of English literature.
- the ability to read, understand, interpret and analyze independently literary texts in various genres.
- familiarity with major literary theories and some of the major literary texts produced in countries other than England and India.

Course Outcomes:

Core Course 1: The aim is to familiarize students with the major trends, ages and movements in British literature. The course aims to enable students to understand the various literary periods

and changes in the literary history of England up to the 18th century. This constitutes the first part of the study of the literary history and criticism in British literature.

Core Course 2: The course aims to impart students the knowledge of classical European and Indian literature. The students are introduced to a few literary genres like epic and classical drama.

Core Course 3: This paper is the second part of the study of the literary history and criticism in British literature. Students are familiarized with the various literary trends, periods and movements in British literary history from the 19th century to the Postmodern period.

Core course 4: This course deals with literature in English produced in India. The course aims to impart students an understanding of the writings produced in English in India and the characteristics of Indian writings in the various genres like poetry, fiction and drama.

Core Course 5: The students are introduced to literary theory. This course is aimed at familiarizing students with the various theories used for the critiquing, analyzing and interpreting literary texts. The students learn about the fundamental principles and tenets of various literary theories.

Core Course 6: The students are introduced to the study, analysis and interpretation of literature during the various literary periods in England. The course deals with the literature produced in England during the 14th to the 17th centuries. The aim of the course is to familiarize students with the major authors, their works and the characteristics of the literature produced during this period. The focus is on the study of the various genres of literature that dominated the literary scene during the period.

Core Course 7: This course deals with the study of the literature produced in England during the 17th and 18th centuries. The aim of the course is to familiarize students with some of the major authors and their works produced during this period. Students learn to read, interpret and analyze literary texts and gain an understanding of the literary characteristics of the writers, the literary genres and the literary periods.

Core Course 8: This course aims at familiarizing students with 18th century British literature. The students read, learn to analyze, interpret and appreciate the literary works by the prominent writers of the age in different literary genres.

Core Course 9: In this course, the students read the literary works of British authors of the early 19th century. The course dealing with poetry and fiction aims at sensitizing students with the salient characteristics of Romantic literature as manifested in the works of its major authors.

Core Course 10: This course deals with British Victorian literature. The course is aimed at sensitizing students with the salient characteristics of British Victorian literature. The students

learn to interpret and appreciate the works of the leading poets and fiction writers, thereby gaining an understanding of the literary tendencies of the age.

Core Course 11: The students are introduced to an important area of literary studies, namely, the writings of women. Literary studies are incomplete without studying the contribution of women authors to literature. This course therefore, aims at sensitizing students with the writings by women authors in different genres and includes the British, American and Indian authors.

Core Course 12: This course is the culmination of study of the literary periods, movements, trends and changes as reflected in the literary works of British authors. The course deals with 20th century British literature in different genres. It aims at imparting to the students an understanding of the modernist trends and issues dealt by various authors. The students learn to interpret, analyze, appreciate and critique literary works.

Core Course13: The students are introduced to World literature - the literature produced in the different countries of the world. The course includes French, American, Russian and Scandinavian authors in different genres. The students are sensitized to various literary, social and cultural issues and they read, learn to interpret, appreciate and critique literary works.

Core Course 14: The students are introduced to another area of literary studies, namely, Postcolonial literature. The course aims at familiarizing students with the Postcolonial concerns of authors mainly in poetry and fiction. Students learn to critique literary works in the light of Postcolonial theory.

Discipline Centric Elective (DSE) -1: This course deals with the study and analysis of the writings of Modern Indian authors in translation. Students study the translated works in different genres. The course aims at sensitizing students with the social and cultural issues as they are reflected in the works of modern writers.

Discipline Centric Elective (DSE) -2: The students are introduced to the literature of the Indian diaspora. The students are sensitized to the issues pertaining to diaspora lives.

Discipline Centric Elective (DSE) -3: The course enables students to read and learn about literary criticism. The course contains texts by some of the leading literary critics. Students gain knowledge about the best practices in literary criticism.

Discipline Centric Elective (DSE) - 4: This course offers students readings in contemporary literary theory. The aim of the course is to enable students to read and understand critical essays and be familiar with some of the best practices in contemporary literary criticism.

Skill Enhancement Course (SEC) -1: This course deals with imparting students skill in Translation. The students are familiarized with the theory and practice of translation. The objective of the course is to impart the skill of translating texts from the source language to the

target language. It is hoped that students will gain the necessary skills required for greater employability.

Skill Enhancement Course (SEC) -2: This course aims at improving the soft skills of students. It is hoped that with the help of this course, students will be better able to cope with the requirements of various employment opportunities in the competitive social environment.

Generic Elective Course (GE) -1: The aim of this course is to improve and enhance the writing and reading skills of the students. The course deals with teaching the students the basics of good writing and through the reading of prose pieces the purpose is to provide the students practice in reading skills.

Generic Elective Course (GE) -2: The course enables students to read and understand prose pieces. The aim is to enhance the language abilities of students through the reading of prose pieces.

GEOGRAPHY HONOURS
PROGRAMME SPECIFIC OUTCOMES(PSO)

PSO1. Understand the relevance of geographical knowledge to everyday life.
PSO2. Getting the ability to communicate geographic information utilizing both lecture and practical exercises.
PSO3. Inculcate the ability to evaluate geographical problems effectively.
PSO4. Exhibit the skill in using geographical research tools including spatial statistics, cartography, remote sensing and GIS.

COURSE OUTCOMES (CO)

SEMESTER I

CORE-I GEOMORPHOLOGY
1. Understand the functioning of Earth systems in real time and analyze how the natural and anthropogenic operating factors affects the development of landforms
2. Distinguish between the mechanisms that control these processes
3. Assess the roles of structure, stage and time in shaping the landforms, interpret geomorphological maps and apply the knowledge in geographical research.

CORE-II CARTOGRAPHIC TECHNIQUES
1. Read and prepare maps.
2. Comprehend locational and spatial aspects of the earth surface.
3. Use and importance of maps for regional development and decision making.

GE-01 SUSTAINABLE DEVELOPMENT
1. Understand difficulties in defining the components of sustainable development;
2. Distinguish the patterns of regional development of the world and the need for

sustainable development plan;
3. Improved understanding of prevalent issues in environment, society, economy and to provide a geographical interpretation with special reference to India.

SEMESTER II

CORE-III CLIMATOLOGY & OCENOGRAPHY

1. Understand the elements of weather and climate and its impacts at different scales.
2. Comprehend the climatic aspects and its bearing on planet earth.
3. Understand the oceanic process and availability of resources.

CORE-IV THEMATIC CARTOGRAPHY

1. Read and prepare maps.
2. Comprehend locational and spatial aspects of the earth surface.
3. Use and importance of maps for regional development and decision making.

GE-02 CLIMATE CHANGE

1. Understand the foundational concepts of climate change and its impacts.
2. Assess the human and environmental vulnerability to climate change.
3. Learn the various adaptation and mitigation for reducing the impacts of climate change and national action plan.

SEMESTER III

CORE-V HUMAN GEOGRAPHY

1. Know the changing human and cultural landscape at different levels.
2. Understand patterns and processes of population growth and its implications.
3. Appreciate the nature and quality of human landscapes.

CORE-VI EVOLUTION OF GEOGRAPHICAL THOUGHT

1. Distinguish the paradigms in geography discipline through time.
2. Understand the geographical thinking in different regions of world.
3. Appreciate the past and future trends of world geography in general and Indian Geography in particular.

CORE-VII REMOTE SENSING AND GIS

1. Understand various components and principles of GIS
2. Construct the thematic maps using different digital layers
3. Apply GIS in various geographical studies
4. To introduce GIS (Geographic Information System) as a tool of spatial science.

SEC – 01 REMOTE SENSING

1. Appreciate the strength and application of remote sensing
2. Map the resources, their location and availability
3. Apply this knowledge for sustainable development

GE-03 DISASTER MANAGEMENT

1. Acquire knowledge on concepts, types, distribution and mapping of disasters in India;
2. Understand the man-made disasters and human negligence in the context of environment;
3. Bring awareness about the preparedness, mitigation and processes of disaster risk reduction.

SEMESTER IV

CORE-VIII ECONOMIC GEOGRAPHY

1. Appreciate the basic concepts and approaches of economic geography;
2. Examine the significance and relevance of theories in relation to the location of different economic activities;
3. Distinguish different types of human activities and their inter and intra relationships.
4. To integrate the various factors of economic development to acquaint the students about dynamic aspects of economic geography.

CORE-IX ENVIRONMENTAL GEOGRAPHY

1. Appreciate the structure and functions of ecosystems with examples;
2. Understand the environmental problems and relevant management strategies;
3. Acquire knowledge about the new environmental policies and the need to revise policies to tackle the environmental issues of India, in particular.
4. Awareness about the new dimensions of global environmental issues with reference to India.

CORE-X STATISTICAL METHODS IN GEOGRAPHY

1. Understand the basics of data collection and, processing for the meaningful outcomes
2. Understand the selection of proper sampling techniques for the collection of data
3. Put into practice the results obtained for spatial analysis of results and to apply various statistical softwares for the study.

SEC – 02 GEOGRAPHIC INFORMATION SYSTEM

1. Understand various components and principles of GIS
2. Construct the thematic maps using different digital layers
3. Apply GIS in various geographical studies.

GE-04 RURAL DEVELOPMENT

1. Appreciate the concepts, needs and various approaches to rural development;
2. Understand the strong economic bases of rural areas of India;
3. Appreciate the area based and target group based approaches and provision of services to rural development.

SEMESTER V

CORE-XI REGIONAL PLANNING AND DEVELOPMENT

1. Identify notable lagging regions and solutions for their overall development
2. Have comprehensive understanding regarding the different regions and application of different models and theories for integrated regional development.

3. Select appropriate indicators for the measurement of socio-economic regional development.
4. To identify the causes of regional disparities in development, perspectives and policy imperatives.

CORE-XII FIELD WORK AND RESEARCH METHODOLOGY

1. Conduct proper field work for the collection of primary data to bring out grassroots realities.
2. Make use of proper tools and surveying methods for measurement in context of collection and processing of data.
3. Prepare a report based on field data.

DSE – 01 RESOURCE GEOGRAPHY

1. Understand the basic components of hydrological cycle and comprehend practices of integrated watershed management.
2. Evaluate the water balancing and river basin and water disputes.
3. Study the soil as a basic resource, focusing its distribution, problems and management.

DSE – 02 AGRICULTURAL GEOGRAPHY

1. Conceptualise the agriculture and its determinants.
2. Get the overview of Indian and World agriculture regions and systems.
3. Have sound knowledge of agriculture revolutions and food security.

SEMESTER VI

CORE-XIII GEOGRAPHY OF INDIA

1. Learn the differences in terms of varied physiography of India;
2. Understand the demographic component and settlement structure in India;
3. Study the economy and various types of resources in India.

CORE-XIV DISASTER MANAGEMENT BASED PROJECT WORK

1. Understand processes and impact of disaster
2. Understand both the natural and man-made disaster and human negligence in context of environment
3. Write a field work based report on Disaster Management to minimize the disaster risk/ Risk from Disaster.

DSE – 03 URBAN GEOGRAPHY

1. Understand the fundamentals and patterns of urbanization process
2. Learn the functional classification of cities and Central Place Theory

DSE – 04 POPULATION GEOGRAPHY

1. Learn the role of demography and population studies as a distinct fields of human geography
2. Have sound knowledge of key concept, different components of population along with its drivers
3. Examine population dynamics and characteristic with contemporary issues.

HISTORY HONOURS

Programme Outcomes-

PO1- Demonstrate comprehensive knowledge and understanding of one or more disciplines.

PO2-Develop inter-disciplinary analytical skills and critical thinking.

PO3- Express thoughts and idea effectively in writing and orally.

PO4- Analyze synthesize and integrate knowledge.

PO5- Become employable in government and non government organizations.

Programme Specific Outcomes-

PSO1- Understand the socio cultural heritage of India and other parts of the world.

PSO2- Provide multi-casual explanations of major historical developments based on a contextualized analysis of Regional, Indian and World history.

PSO3- Identify and analyse the significance of historical changes and explain the patterns of such transitions.

PSO4- Demonstrate knowledge of the chronology, narrative and major events of history.

PSO 5- Extract evidences from primary and secondary historical sources by analyzing and evaluating them.

Course Outcomes-

CO1- CCO1- Provide an extensive survey of Early Indian history from pre-historic times to the end of Vedic cultures in India.

CO2-CC02- Explain the significant developments in medieval and modern Jharkhand.

CO3-CC03- Explore the transition from proto-historical to early medieval phase highlighting major changes that shaped the character of the Indian civilization.

CO4-CC04- Develop a historical understanding of the major developments in Jharkhand in the later nineteenth and twentieth centuries.

CO5-CC05- Trace the patterns of change and continuities in the economic,social, political and cultural aspects of life during early medieval India.

CO6-CC06-Trace the transition from feudalism to capitalism in Europe.

CO7-CC07- Explore the history of India between the thirteenth and fifteenth centuries with reference to Delhi Sultanate, regional politics and socio-religious movements.

CO8-CC08- Analyseeconomic,social and political transformations in Europe during the 17^{th} and 18^{th} centuries.

CO9-CC09- Understand the developments that led to the establishment and consolidation of the Mughal state in India.

CO10-CC10- Study the 18^{th} century Kingdoms and early colonial state in India.

Co11-CC11- Explain the French Revolution and its repercussions, impact of industrial capitalism and new social movements in Europe.

CO12-CC12- Understand the chief features of Indian history between the early seventeenth and mid eighteenth centuries.

CO13-CC13- Discuss the socio-economic and political trends in colonial India from the later half of the 19^{th} centuries.

CO14- CC14- Analyse the developments in modern Europe during the19th and 20^{th} centuries.

CO15—DSE01- Give an overview of the history of the USSR from the revolutions of 1917 to the end of the Second World War.

CO16-DSE02- Trace the transformations of china from an Imperial power into a modern nation.

Co17-DSE03- Explain the emergence of the USSR as a super power between1945 and 1991.

CO18-DSE04- Discuss the transition of Japan from a feudal to a modern industrial capitalist nation.

CO19-GE01- Understand the importance of Environment and ecology and highlight environmental issues and movements in colonial and independent India.

CO20- GE02- Demonstrate an understanding of history as an interdisciplinary practice and give an overview of Research methodology.

CO21-GE03- Trace the important development in contemporary India from 1935 to 1970s.

CO22-GE04- Demonstrate knowledge of the issues in contemporary world.

CO23-SEC01- Demonstrate knowledge of the structure and functioning of archives' and museums.

CO24-SEC02- Explore the interface between various forms of popular culture and their historical evolution.

SOCIOLOGY HONOURS

Programme Specific Outcomes

1. Comprehend the sociological concepts and theories.
2. Develop a sociological perspective.
3. Learn to observe social reality and generalize it objectively without any subjective predisposition.
4. Develop knowledge about the social processes and social institutions man encounters as a member of the society.
5. Get an impression about the basic composition of Indian society, its historical moorings, basic philosophical foundations of the society and the institutions.
6. Gain an understanding of some of the classical contributions in Sociology, and their contemporary relevance.
7. Get an impression about the factors that propel change in the society.
8. Have a grip over the basic steps involved in social research and the types of social research with their applicability
9. Trace out the evolution and institutionalization of the institution of "Patriarchy".
10. Assess the initiatives undertaken for gender development with the paradigm shift from time to time.
11. Generate an idea about the typicalities of the rural society and the institutions operating therein and their dynamics.
12. Derive ideas about rural social problems of the country.

Course Outcomes

Core Course 1
Introduction to Sociology- I

1: The Course attempts to introduce the discipline to students from diverse trainings and capabilities.
2: The course seeks to initiate the students into a sociological way of thinking.
3: The course attempts to provide a foundation for the other more detailed and specialized courses in sociology.
4: The paper enables the students to know the various convergence and divergences of Sociology with other social science disciplines in terms of the subject matter, nature and scope of the discipline and its approach.
5. The course enables the students to develop knowledge about the historicity of the discipline.

6: The course enables the students to understand the meaning, process and agencies of socialization.
7: The course enables the students to understand the meaning, functions, destruction of social structures.
8. The course enables the students to understand the interrelationship between the individual and the social group.
9. The Course introduces the concepts of social structure, social institutions and social processes.
10. The course enables the students to understand the concept of culture and the impact of culture on society.
11. The course enables the students to understand the concept of change in society.

Core Course 2
Sociology of India- I

1. The Course attempts to introduce the processes and modes of construction of knowledge of India.
2. The course enables the students to understand the ideas of Indian Society generated by the colonizers, the nationalists and the subalterns.
3. The course draws the attention of the students to the key concepts and institutions which are useful for the understanding of Indian society.
4. The course enables the students to get an impression about the basic composition of Indian society, its historical moorings, basic philosophical foundations of the society and the institutions.
5. The course assists the students in learning about the changing institutions, the processes, the agents and the interventions that bring about change in the Indian society.
6. The course enables the students to understand the caste structure in Indian society.
7. The course enables the students to understand the agrarian structure and the classes within the agrarian structure.
8. The course assists the students in learning about the characteristics of Industrial Labour.
9. The course enables the students to understand the concept of Tribe and the shifts in their lives in the context of contemporary society.
10. The course gives an idea about the typicality's of the rural society and the institutions operating therein and their dynamics.
11. The course enables the students to understand the concept of Kinship, the kinship terms and the types of kinship in Indian society.
12. The course enables the students to understand the inter-relation between religion and Indian society.

Core Course 3
Introduction to Sociology- II

1. The Course provides a general introduction to sociological thought.
2. It enables the students to study from the original texts to give them a flavor of how over a period of time sociological thinkers have conceptualized various aspects of society.
3. It assists the students in gaining an understanding of some of the classical contributions in Sociology, and their contemporary relevance.
4. It assists the students in learning about the methodological shift in the discipline over the years.

Core Course 4
Sociology of India- II

1. The course enables the students to understand the ideas of Indian Society generated by nationalists like M. Gandhi, J. Nehru and B R Ambedkar.
2. The course enables the students to understand the trajectory of Dalit politics in Independent India.
3. The course assists students in the task of tracing the trajectory of Women's movements in India.
4. The course assists students in the task of tracing the trajectory of peasant movements in India since the colonial period.
5. The course enables the students to understand the concept of middle class in India, its composition and the changes in middle class in India over the years.
6. The course assists students in analyzing the challenges to the State and Indian Society.
7. The course enables the students to understand the growth of modern nationalism and its consequences.
8. The course enables the students to understand the phenomenon of communalism in Indian society.
9. It helps students to get an idea about the concept of secular society and the ideas pertaining to uniform civil code for India society.

CORE COURSE 5
POLITICAL SOCIOLOGY

1. This course attempts to contextualize the study of Politics in society.
2. The course introduces the students to some major theoretical debates and concepts in Political Sociology, while situating these within contemporary political issues.

3. It enables the students to develop a comparative understanding of political relationships through themes such as power, governance and state and society relationships.
4. The course enables the students to understand the concepts of power, authority, state, citizenship and governance.
5. It assists the students in developing an understanding of the political ruling elites.
6. The course familiarizes the students with the diverse political processes, participation types and determinants and the political institutions.
7. The course enables the students to understand the concept and issues surrounding decentralization.
8. The course enables the students to understand the local structures of power.

CORE COURSE 6
SOCIOLOGY OF RELIGION

1. The course lays primacy to the understanding of religious over individual religions.
2. The overarching concern of the course is to follow up the linkage between the social and religious.
3. The course enables the students to understand the varied perspectives on the relationship between religion and the society and how each affects the other.
4. The course enables the students to understand the elements of religion.
5. The course enables the students to understand the techniques of religious practices.
6. The course enables the students to understand the sociological significance of religious practices.
7. The course enables the students to understand the relationship between religion and science.

CORE COURSE 7

SOCIOLOGY OF GENDER

1. The course attempts to conceptualize what is “Gender” and what is “Sex” and draw a line of distinction between the two.
2. The course enables the students to understand the relevance of gender studies in contemporary society.
3. The course enables the students to understand the concepts of gender roles, responsibilities, rights and relations.

4. The course enables the students to understand gender as a basis of power distribution in society.
5. The course assists students in tracing the evolution and institutionalization of the institution of "Patriarchy".
6. The course enables the students to understand the concepts of masculinity and femininity.
7. The course enables the students to understand gender inequality in India.
8. The course assists students in tracing the trajectory of women's resistance movements.
9. The course familiarizes students with the constitutional and legal safeguards for women in India.

CORE COURSE 8

ECONOMIC SOCIOLOGY

1. The course provides an understanding of the social and cultural bases of economic activity.
2. The course highlights the significance of sociological analysis for the study of economic processes in local and global contexts.
3. The course familiarizes the students with the varied perspectives in economic sociology ranging from classical theories to contemporary ones.
4. The course explains to the students the social meaning of money.
5. The course attempts to familiarize the students with the socio- cultural meaning and significance of market.
6. The course explains to the students the concepts of gift and reciprocity.
7. This course enables the students to trace the historical trajectory and evolution of the diverse systems of production, consumption, circulation and exchange.
8. The course introduces the students to the phenomenon of commoditization in capitalist societies.
9. The course familiarizes the students with meaning and nature of socialism and socialist societies.
10. The course familiarizes the students with the neo- liberal concept of development.
11. The course familiarizes the students with the concept, characteristics and social significance of globalization.

CORE COURSE 9
SOCIOLOGY OF KINSHIP

1. This course aims to introduce general principles of kinship and marriage in societies.
2. The course looks at the trajectories and new directions in kinship studies.

3. The course familiarizes the students with the kinship terms and terminologies.
4. This course explains to the students the varied approaches in terms of tracing kinship ties.
5. The course familiarizes the students with the varied types, nature and characteristics of families.
6. The course familiarizes the students with the varied types, nature and characteristics of households.
7. The course familiarizes the students with the varied types, nature and characteristics of marriages in different societies.
8. The course familiarizes the students with the concept of new reproductive technologies and how these are altering kinship ties in contemporary societies.
9. The course familiarizes the students with the concept of cross cultural gender studies.
10. The course provides an insight into contemporary family types like gay families, lesbian families, single parent families.

CORE COURSE 10
SOCIAL STRATIFICATION

1. This course introduces students to Sociological Study of Social Inequalities.
2. The course acquaints students with principal theoretical perspectives on social stratification.
3. The course familiarizes students with the diverse forms of Social inequality in articulation with each other.
4. The course familiarizes students with the basic concepts in stratification studies like equality, inequality, deprivation, hierarchy, social exclusion.
5. The course introduces the concept of social mobility, its types, sources and causes.
6. The course also introduces to the students the diverse bases of social inequality.

CORE COURSE 11
SOCIOLOGICAL THINKERS I

1. The course introduces the students to the classics in the making of the discipline of sociology through selected texts by the major thinkers.
2. The course introduces Karl Marx’s theory and methodology of study.
3. The course introduces Emile Durkheim’s theory and methodology of study.
4. The course introduces Max Weber’s theory and methodology of study.
5. The course enables students to trace the trajectory of the methodological shift in the discipline over the years.
6. The course prepares the students for the study of the contemporary sociological theories and perspectives.

CORE COURSE 12
SOCIOLOGICAL RESEARCH METHODS- I

1. The course is a general introduction to the methodologies of sociological research methods.
2. The course provides the student with some elementary knowledge of the complexities and philosophical underpinnings of research.
3. This course enables the students to get an understanding of the nature of scientific methods, nature of social Phenomena and the way of attaining value neutrality.
4. This course provides the students with a research insight that will enable them to capture the most relevant data in an objective manner.
5. The course familiarizes the students with significant challenges in social research and prepares them to be able to counter the same.

CORE COURSE 13
SOCIOLOGICAL THINKERS II

1. To introduce introduces the students to post-classical sociological thinking through some original texts.
2. The course introduces Neo- Functional theory.
3. The course introduces the neo- conflict theory.
4. The course introduces the structuralist perspective.
5. The course introduces phenomenology.
6. The course familiarizes the students with the concepts of anomie, latent and manifest functions.
7. The course introduces the interactionist perspective.

CORE COURSE 14
SOCIOLOGICAL RESEARCH METHODS- II

1. This course initiates the students into conducting field based research.
2. It enables the students to be able to formulate a working hypothesis.
3. This course familiarizes them with the concept of the field.
4. This course also familiarizes and prepares them for the issues and challenges that the field offers.
5. This course teaches the various quantitative and qualitative methods of data collection.
6. The course also explains to the students the process of data presentation and analysis.
7. The course offers them an opportunity to step out into the field and conduct a social research and thereupon submit their research project.

GENERIC ELECTIVE I
GENDER AND VIOLENCE

1. Gendered violence is routine and spectacular, structural as well as situated. This course attempts to provide an understanding of the logic of that violence.
2. This course familiarizes the students with the overt and covert forms of gender violence and sexual violence.
3. The course tries to equip the students with a sociologically informed basis for making pragmatic, ethical and effective choices while resisting or intervening in the context of gendered violence.
4. The course further familiarizes the students with the women's liberation movement: its ideology, need and its trajectory.
5. The course familiarizes the students with the concept of sexual harassment at the workplace.
6. The course introduces the students to the nuances of gendered violence in the context of the family and within the households.
7. The course attempts to allow students to observe and understand the role gender plays and the ways in which gender violence unfolds in conflict situations.
8. The awareness that this course generates is crucial for purposes of resistance in everyday life and also for the purposes of policy making.

GENERIC ELECTIVE II
RE-THINKING DEVELOPMENT

1. This paper examines the ideas of development from a sociological perspective.
2. The course introduces students to different approaches to understanding development.
3. The course assists students in tracing the trajectory of Indian experience with development from an interdisciplinary perspective.
4. The course introduces the concept of sustainable development and its contemporary relevance.
5. The course introduces the concept of inclusive development and its need.
6. The course familiarizes students with the various developmental regimes in India and their distribution centric policies.
7. The course familiarizes the students with the challenges in the path of development like sustainability, displacement, environmental crisis, etc and encourages them to look for innovative solutions.

DISCIPLINE SPECIFIC ELECTIVE- I
URBAN SOCIOLOGY

1. This course provides an exposure to key theoretical perspectives for understanding urban life in historical and contemporary contexts.
2. The course provides an insight on some concerns of urban living while narrating the subjective experiences of urban communities.
3. The course comprises of case studies from India and other parts of the world so as to enable the students to relate to the complexities of urban living.
4. The course assists the students in understanding the urban institutions, their functioning and challenges.
5. The course enables the students to gain insight into urban development plans, programs and efforts.
6. The course familiarizes the students with the concepts of public leisure place and urban tourism.
7. The course provides an insight into the role of factors like caste, class and gender in urban politics.
8. The course enables the students to understand the role of migration in the process of urban growth and transformation.
9. The course introduces the concept of urban community and its characteristics.
10. The course gives the students an insight into urban networks- both human and technological.
11. The course explains the concept of city as a site of culture and cites the examples of different cultural contexts in different types of cities.
12. The course encourages the students to look for innovative solutions to urban crises.

DISCIPLINE SPECIFIC ELECTIVE- II
AGRARIAN SOCIOLOGY

1. The course begins by introducing the nature and characteristics of agrarian societies.
2. The course introduces the students to the agrarian theories based on agrarian studies by sociologists like Andre Beteille, Daniel Thorner.
3. The paper familiarizes the students with emerging global agrarian concerns like internal migration, agrarian distress and farmer suicide.
4. The course explains to the students the functioning of agrarian commodity systems.
5. The course also familiarizes the students with the concepts in moral economy in agriculture.
6. Despite being comparative in general, the paper specifically focuses on Indian agrarian society and its issues.

7. The course explains to the students the agrarian class structure in Indian society.
8. The paper familiarizes the students with the concept of agrarian markets in India.
9. The course introduces the students to the concepts of green revolution in India and the various Land reforms undertaken.
10. The course gives students an insight into the various agrarian movements in India.
11. The course explains to the students how gender affects land distribution and work distribution in agriculture. It focuses specifically on gender discrimination and oppression within the agrarian society.
12. The course gives student an insight into the Global Agrarian Order: the changing modes of production in agriculture like Crop cultivation system, crop alteration and bio-technology.
13. The paper introduces students to the concept of agro commercial capital.
14. The paper familiarizes the students with the programs and policies directed towards the process of agrarian transformation in India.

DISCIPLINE SPECIFIC ELECTIVE- III
SOCIOLOGY OF HEALTH AND MEDICINE

1. The course introduces students to the sociology of health, illness and medical practice by highlighting the significance of socio-cultural dimensions in the construction of illness and medical knowledge.
2. The paper familiarizes the students with the theoretical perspectives (socio- cultural) and theories with regard to health and Illness.
3. The paper familiarizes the students with the public health policies in India.
4. The course explores the medical practices in diverse societies through ethnographies to enable comparative understanding.
5. The course familiarizes the students with the popular perceptions of medicine.
6. The course provides an insight into the political economy of Western Medicine in Third World Countries.

DISCIPLINE SPECIFIC ELECTIVE- IV
INDIAN SOCIOLOGICAL TRADITIONS

1. This paper primarily provides perspectives of key Indian sociologists on issues pertaining to sociology and Indian society.
2. The course introduces the celebrated ideas of G S Ghurye on Caste and Race in India.
3. The course introduces Dr Radhakamal Mukherjee's ideas on Values and Social Ecology.
4. The course introduces Dr D P Mukherjee's ideas on tradition and modernity and his ideas on the emergence and evolution of the middle class in India.

5. The course introduces Professor Verrier Elwin's ideas on tribes in India.
6. The course explores Dr M.N Srinivas' ideas on social change in Indian society.
7. The course introduces Professor IrawatiKarwe's ideas on gender and kinship in Indian society.
8. The course explores Professor LeelaDube's ideas on caste and gender relations in the Indian society.

ABILITY ENHANCEMENT- I (SKILL BASED)
READING, WRITING AND REASONING FOR SOCIOLOGY

1. The course attempts to initiate the students into learning the art of reading and writing academic prose and to skillfully differentiate it from the performance of these activities in ordinary language.
2. This paper is similar to a crash course in survival techniques for developing literacy in academic language.
3. It consists of a graded series of reading and writing exercises using 'real' texts from the social sciences that will enable students to tackle text-related tasks with confidence.
4. There is a conscious attempt to generate synergies by mirroring the reading and writing exercises.

ABILITY ENHANCEMENT- II (SKILL BASED)
ETHNORAPHIC FILMMAKING

1. This course focuses on doing sociology and social anthropology through forms other than the written, in particular, the oral, aural, and the visual.
2. It introduces students to film techniques as a form and method of description and argument and enables a comparison between film and the written mode as ethnography.
3. One concern that may be pursued is how the visually challenged encounter, experience and represent the field.
4. The course introduces the students to the different modes of filmmaking like- Screening of films, film scenes and documentaries.
5. The course introduces the students to hand held camera practices, multiple shots, etc
6. The course introduces the students to tools and methods of film editing.
7. The course provides a practical experience to students in film making.

ECONOMICS HONOURS

Programme Specific Outcome

Students will:

1. Get an understanding of basic economic theory;

2. Learn the mathematical and statistical techniques necessary for a proper understanding of the discipline;

3. Get an introduction to real world economic issues and problems facing the country and the world;

4. Get trained in the art of economic modeling.

5. Get trained to collect primary data and learn sampling techniques;

6. Learn to use scientific empirical methods to arrive at conclusions about the validity of economic theories;

7. Gain an understanding of proper policy responses to economic problems;

Course Outcome

SEM 1

ECOCC101	Expose the basic principles of microeconomic theory.
ECOCC102	Transmit the body of basic mathematics that enables the study of economic theory at the undergraduate level
ECOGE101	Some basic concepts and terminology that are fundamental to statistical analysis and inference.

SEM 2

ECOCC203	Introduce the basic concepts of Macroeconomic
ECOCC204	To transmit the body of basic mathematics that enables the study of economic theory at the undergraduate level
ECOGE202	Basic concepts and terminology that are fundamental to statistical analysis and inference.

SEM 3

ECOCC305	To provide a sound training in microeconomic theory to formally analyse the behaviour of individual agents.
ECOCC306	Formal modelling of a macro-economy in terms of analytical tools.
ECOCC307	Some basic concepts and terminology that are fundamental to statistical analysis and inference.
ECOSEC301	course introduces students to the economics of finance.
ECOGE303	To expose the students to the field of applied mathematical economics.

SEM 4

ECOCC408	It covers general equilibrium and welfare, imperfect markets and topics under information economics.
ECOCC409	The students are introduced to the long run dynamic issues like growth and technical progress.

ECOCC410 This course provides a comprehensive introduction to basic econometric concepts and techniques.

ECOSEC402 This course introduces the student to collection and presentation of data. It also discusses how data can be summarized and analysed for drawing statistical inferences.

ECOGE404 This course is designed to expose the students to the field of applied mathematical economics.

SEM 5

ECOCC511 This course reviews major trends in economic indicators and policy debates in India in the post-Independence period, with particular emphasis on paradigm shifts and turning points.

ECOCC512 Discussion of alternative conceptions of development and their justification.

ECODSE501 This course exposes students to the theory and functioning of the monetary and financial sectors of the economy.

ECODSE502 The paper deals with the nature of government intervention and its implications for allocation, distribution and stabilization.

SEM 6

ECOCC613 This course examines sector-specific polices and their impact in shaping trends in key economic indicators in India.

ECOCC614 Basic demographic concepts and their evolution during the process of development.

ECODSE603 This course focuses on economic causes of environmental problems.

ECODSE604 This course develops a systematic exposition of models that try to explain the composition, direction, and consequences of international trade, and the determinants and effects of trade policy.

HINDI HONOURS

The Department of Hindi of St. Xavier's College, Ranchi was established in the year 1944. When it started, the department offered Intermediate (Principal Hindi & R.B. Hindi) and Graduation (Principal Hindi and Hindi Honours) courses. The Department began its M.A. Programme in the year 2005. It has five regular faculty members, all of them holding doctoral and two of them holding post-doctoral degrees. All of them are involved in research work. Two of the senior most faculty members completed their Minor Research Projects and Major Research Projects. The senior faculty members are involved in supervising PhD research scholars, impart training in workshops and other programmesorganised by various government and social organisations. They also have several books to their credit. Since its inception, the department has been recording outstanding result. Besides focussing on the academic growth of students, the department also strives to work for an overall development. The department encourages active participation in literary, social and cultural events at regular intervals. It holds seminars, and arranges an educational tour every year.

Hindi is one of the most widely spoken languages not only in the country but also in the world. Because of its flexibility, it is ever growing, ever flourishing. Not only this, its applications in different walks of life are also many. The programme reflects the growth, changes and the current trends in Hindi language and literature. It takes into consideration the changing social norms, patterns of communication, the role of language in the present scenario and the changing social values of our times. Since language carries culture, Hindi too should be perceived not just as a language but also as a carrier of art, culture, music and literature. The programme also aims at developing an understanding of the culture of the places where Hindi is used. The course has been designed such that the students are able to look back at the origins of the language and the culture it represents and at the same time learn to use the language in the context of the contemporary society to fulfil their needs in the present times.

VISION

- To develop critical thinking among students.
- To enable a holistic understanding of language, literature and culture in general and that of the Hindi language and literature in particular.
- To develop among the students a positive outlook and a sense of pride for Hindi.
- To develop Language Proficiency and Communication Skills among students.
- To instil the sense of responsibility among students.
- To inculcate the feeling of patriotism and admiration for the country among students.
- To help students establish a harmonised connection between the traditional and modern ideas of language in general and the Hindi language in particular.
- To enable students to realize the relation between the evolution of thought and culture and the evolution of language.
- To form optimistic, sensitive and mature human beings who can responsible to socio-political causes and calls.

MISSION

- To impart a comprehensive knowledge of Hindi language and literature.
- To acquaint the students with the relevance of Hindi in building careers.
- To enable students to take up Hindi for appearing for the civil service examinations.
- To familiarise the students with the use of Hindi in translation and interpretation.
- To develop a journalistic attitude.
- To enable students to use Hindi as a tool to develop communication skills and other soft skills.
- To make students understand the importance of Hindi in the field of advertisement and marketing.
- To hone the skills of creative writing and writing for media.
- To develop stage skills for programme-hosting and voice over.
- To inculcate leadership qualities among students.
- Personality development.

- To encourage team spirit, mutual cooperation and the ability to improve public relations.
- To enable students to communicate effectively in Hindi as well as local languages and remain connected with people by using modern ways and means like social media.

JOB PROSPECTS

- Teaching – School, College, University
- Administrative Services – Centre and State
- Journalism and Mass Communication
- Editing and Review
- Hindi Officer in Public and Private Sectors
- Translator
- Interpreter
- Anchor, Announcer and Programme Host
- Public Relations Officer
- In the field of Creative Writing and Advertisement

Course Objectives

Semester I

Paper	Objectives
CC1 (Hindi SahityakaItihaas: Aadikaal)	To enable the students to have a comprehensive knowledge of the history of Hindi literature, especially that of Aadikaal. The students shall be able to place literary works against socio-cultural and literary trends and contexts.
CC2 (Hindi SahityakaItihaas: Bhaktikaal)	To enable the students to have a comprehensive knowledge of the history of Hindi literature, especially that of Bhaktikaal. The students shall be able to place literary works against socio-cultural and literary trends and contexts.
AECC-I	To enable the students to acquire an understanding of the basics of the various types of communication and develop their communicative skills.
G.E I	The purpose of this paper is to enable students from varied disciplines an exposure to different aspects of Hindi language and literature, and also acquaint them with the literature and culture of Jharkhand.

Semester II

Paper	Objectives
CC3 (Hindi SahityakaItihaas: Reetikaal)	To enable the students to have a comprehensive knowledge of the history of Hindi literature, especially that of Reetikaal. The students shall be able to place literary works against socio-cultural and literary trends and contexts.
CC4 (Hindi SahityakaItihaas: Aadhunikkaal)	To enable the students to acquire a holistic understanding of Hindi language and literature in general and that of the modern era in particular.
G.E. II	To introduce the students of various disciplines to the use and study of Hindi in

various walks of social and professional life.

Semester III

Paper	Objectives
CC5 (Aadhunik Hindi Kavita)	To develop critical thinking among students by enabling a deep study of modern Hindi poetry and the emergence and the literary sensibilities of Hindi Romantic poets.
CC6 (Hindi Katha Saahitya)	To help students inculcate the skill of processing and analysing literary outputs and learning the technique of creative writing by studying the stories of eminent story-writers, thereby improving their style, pace and flow of writing.
CC7 (Hindi Nibandhaur Anya GadyaVidhaayen)	To develop among the student a positive outlook towards and a sense of pride for Hindi by exposing them to an in-depth study of various forms and genres of Hindi prose-writing.
SEC I	This paper aims at giving ample opportunities to enhance the skill in and among students of writing for media, screenplay writing and creative writing, and also teaching them the basics of the various aspects of the theatre and also the study and practice of translation and interpretation from English to Hindi and vice versa.
G.E. III	The purpose of this paper is to enable students from varied disciplines an exposure to different aspects of Hindi language and literature, and also acquaint them with the literature and culture of Jharkhand.

Semester IV

Paper	Objectives
CC8 (Prayojanmoolak Hindi)	To familiarise the students with the use and relevance of Hindi as a tool in different walks of life in India and also at the global level. This paper aims at teaching the functional and need-based aspects of the Hindi language in social, academic and professional fields.
CC9 (BhashaVigyaanaur Hindi Bhaasha)	To enable the students to have a holistic understanding of the basics of linguistics – the branches and history of linguistics, the evolution of language and its various aspects.
CC10 (Hindi NaatakaurRangmanch)	To enable an understanding of the social and artistic movements that have shaped theatre and dance and to familiarise the students with the various aspects of theatre, performance and direction.
SEC II	To familiarise the students with the importance and extensive use of Hindi in the world of audio-visual communication, advertisement and marketing.
G.E. IV	To introduce the students of various disciplines to the use and study of Hindi in various walks of social and professional life.

Semester V

Paper	Objectives
CC11 (BharatiyaKaavyashastra)	To help students acquire a broad understanding of the principles of Indian poetics and their application in the study and analysis of literature.
CC12 (PaashchaatyaKaavyashastra)	To enable an in-depth study of western poetics and theories and a deep understanding of the principles of literature as propounded by western scholars and philosophers, and thereby help students understand and analyse literature on the basis of these principles and perspectives.
DSE I	To make the students aware of the Indian cultural ethos by introducing them to the philosophies of Bhaktikaaleen poets like Kabir, Surdas, Tulsidas, and establish their relevance in the modern times.
DSE II	To help students study and understand the evolution of thought and language and its implication in the modern era. Eminent writers like Bharatendu and Romantic poets like Jaishankar Prasad have, with their works, moulded and influenced the modern times, and this course aims at making the students aware of the contribution of these writers in shaping Indian minds.

Semester VI

Paper	Objectives
CC13 (Hindi Aalochana)	To develop critical thinking among students. This paper is a survey of the evolution of Hindi literary criticism, its types and trends and the major figures associated.
CC14 (AsmitamoolakVimarsh)	The different discourses prescribed in this course shall enable the students to reflect upon the portrayal of the various sections of the society in literature. As literature is largely a reflection of life and the times, this course shall lead students to critically evaluate who we are, how we have evolved and where we stand as citizens, as individuals and as a society.
DSE III (Hindi BhashakaItihaas)	This course enables a holistic understanding of language and literature. It helps the students understand the evolution of the Hindi language and its script and establish a harmonised connection between the traditional and the modern ideas of language in general and the Hindi language in particular.
DSE IV	To develop and widen the critical thinking of students by engaging them in an in-depth study of the works and the contribution of the renowned literary critic, Ramchandra Shukla.

POLITICAL SCIENCE HONOURS

Students will:

- Analyse political and policy problems and formulate policy options.
- participate as a civically engaged member of society.
- develop understanding on issues of international and domestic politics and public policy.
- demonstrate critical thinking about key issues of public policy and politics.
- discuss the major theories and concepts of political science and its subfields.
- deliver thoughtful and well-articulated presentations on different areas of the subject.

A) <u>CORE COURSE</u>

COURSE CODE	**COURSE TITLE**	**COURSE OBJECTIVE**
POLCC101	Understanding Political Theory	• To introduce students with the idea of political theory, its history, and approaches. • To reconcile political theory and practice through reflections on the ideas and practices related to democracy. **Learning Outcome:** • Students will be able to learn key concepts needed to understand the political phenomenon. • They will come to know about the role and functions of Political theory. • They will come to understand and explain different theories and contemporary debates in democracy.
POLCC102	Constitutional Government and Democracy in India	• To help a student learn the constitutional designs of state structures and institutions and their work mechanism. • The Indian Constitution accommodates conflicting impulses (of liberty and justice, territorial decentralization, and a strong union, for instance) within

		itself. • The course traces the embodiment of some of these conflicts in constitutional provisions and shows how these have played out in political practice. • It further encourages a study of state institutions in their mutual interaction, and in interaction with the larger extra-constitutional environment. **Learning Outcome:** • Students will be able to learn the philosophy of Indian constitution. • They will come to understand the Nature of Indian state and power and functions of different organs of Indian Government.
POLCC203	Political Theory Concepts and Debates	• To familiarize with the basic normative concepts of political theory. • To encourage critical and reflective analysis and interpretation of social practices through the relevant conceptual toolkit. • To inaugurate new modes of political debates. **Learning outcome:** • Students will be able to develop understanding about the core concepts of political theory.
POLCC204	Political Process in India	• To develop understanding the working of 'modern' Indian political institutions. **Learning outcomes** • Student will be able to understand the trends of Party system in India and changing dynamics of Indian state.

POLCC305	Introduction to Comparative Government and Politics	• to familiarize students with the basic concepts and approaches to the study of comparative politics. More specifically the course will • To focus on examining politics in a historical framework while engaging with various themes of comparative analysis in developed and developing countries. **Learning Outcomes** • The students will be able to understand and apply different approaches to explain the functioning of different types of governing regimes. • They will be able to compare democratic regimes and evaluate their functioning. • They will be able to critically reflect on critical aspects of electoral democracy that includes functioning of parties and the relation between representation and democracy.
POLCC306	Perspectives on Public Administration	• To introduce students with the discipline and basic concepts of public administration. • To explore recent trends, including feminism and ecological conservation and how the call for greater democratization is restructuring public administration. • to provide the students a comprehensive understanding on contemporary administrative developments. **Learning outcomes** • The students will be able to make a difference between the public administration and private administration. • They will be able to explain the journey of discourse in public administration in the sense that how the old public administration view was contested by the idea of new public administration and subsequently the discourse

		moved beyond that and started talking about New Public Management and New Public Service.
POLCC307	Perspectives on International Relations and World History	• To equip students with the basic intellectual tools for understanding International Relations. • To provide a comprehensive overview of the major political developments and events starting from the twentieth century. • to make students aware of the implicit Euro-centricism of International Relations by highlighting certain specific perspectives from the Global South. **Learning Outcome:** • Familiarization with the key concepts of the discipline of IR. • Understanding of linkages between Classical Realism and Classical Geopolitics. • Comprehensive understanding of the key assumptions and arguments of the mainstream IR.
POLCC408	Political Processes and Institutions in Comparative Perspective	• To train students in the application of comparative methods to the study of politics. • to introduce students to some of the range of issues, literature, and methods that cover comparative political. **Learning outcome:** • The students will be able to understand political behaviour, making politics a scientific and empirical study.
POLCC409	Public Policy and Administration in India	• To introduce the students with the interface between public policy and administration in India. **Learning outcome:** • Students can learn how policies are formulated and the various practical issues that are faced during its

		implementation
POLCC410	Global Politics	• To provides comprehensive understanding of contemporary issues in global politics. **Learning outcome:** • students will be able to learn the dynamics of larger issues in global politics like state, human rights, terrorism, nuclear security, human security and environment and the way the global institutions are responding to different concern.
POLCC511	Classical Political Philosophy	• Course goes back to Greek antiquity and familiarizes students with the manner in which the political questions were first posed. Machiavelli comes as an interlude inaugurating modern politics followed by Hobbes and Locke. This is a basicfoundation course for students. **Learning outcome:** • Students will develop understanding on concepts, ideas, and philosophy of Classical Political Philosophers develop their
POLCC512	Ancient Indian Political Thought I	• To introduce students with the specific elements of Indian Political Thought • to provide a sense of the broad streams of Indian thought while encouraging a specific knowledge of individual thinkers and texts. **Learning outcome:** • The student will come to know about the ideas of individual sages and philosophers on politics and functioning of government • They will be able to interlink the themes on the functioning of the Monarchy and its relationship with the people taking the cue from the ideas of individual

		thinkers. • Students will be able to explain the trajectory of ideas on key political questions and institutions of ancient India.
POLCC613	Modern Political Philosophy	• Philosophy and politics are closely intertwined. We explore this convergence by identifying four main tendencies here. Students will be exposed to the manner in which the questions of politics have been posed in terms that have implications for larger questions of thought and existence **Learning outcome:** • The students will know the key ideas of all the political philosophers given in the course.
POLCC614	Modern Indian Political Thought II	• course introduces a wide span of thinkers and themes that defines the modernity of Indian political thought. The • To study general themes that have been produced by thinkers from varied social and temporal contexts. **Learning outcomes:** • students will able to understand the importance of specific elements of Modern Indian Political Thought

B) <u>Generic Elective Course</u>

POLGE01	Nationalism in India	• The course help students to understand the struggle of Indian people against colonialism. It seeks to achieve this understanding by looking at this struggle from different theoretical perspectives that highlight its different dimensions. The course begins with the nineteenth century Indian responses to colonial dominance in the form of

		reformism and its criticism and continues through various phases up to the events leading to the Partition and Independence. • The course tries to highlight its various conflicts and contradictions by focusing on its different dimensions: communalism, class struggle, caste, and gender questions. **Learning outcome:** • The student will be able to examine and explain the impacts of British colonialism in India. • They will know how Indian nationalism is interpreted differently by different schools of thought. • They will be able to understand the role of different cultural and political organizations and ideologies which contributed to the freedom movement of India significantly. • They will be able to understand why and on what basis the country was partitioned.
POLGE02	Contemporary Political Economy	• To familiarize the students with the different theoretical approaches; • To give a brief overview of the history of the evolution of the modern capitalist world; • To highlight the important contemporary problems, issues and debates on how these should be addressed. **Learning outcome:** • Students will able to understand various ideological influence on world order. • They can analyse and provide solutions Problems of contemporary world.
POLGE03	Feminism: Theory and Practice	• familiarizing students with various concepts of feminist theory and its practice in a political context in India. **Learning Outcome:**

- The students will be able to explain
    - How different schools have understood patriarchy and feminist questions differently.
    - The origin, evolution and key issues which are at the core of the feminist movement both in Anglo-American world and India.
    - The representation of the women in the political space of India.
    - How the immense contribution that women make to the family are neglected in computation?

POLGE04	Gandhi and the Contemporary World	• Locating Gandhi in a global frame • to elaborate Gandhian thought and examine its practical implications. • It will introduce students to key instances of Gandhi's continuing influence right up to the contemporary period and enable them to critically evaluate his legacy. **Learning outcome:** • The students would be able to explain about the idea of truth and non-violence which become the bedrock of the Gandhian Philosophy. • They will come to know what was the position of Gandhi on issues like gender question, religious conversion, cow protection, caste and untouchability questions. • They will be able to answer why Gandhi favoured Swadeshi and why he became the critique of modern Industrial Civilization

C) <u>Discipline Specific Elective (DSE)</u>

POLDSE01	Human Rights in a Comparative Perspective	• This course attempts to build an understanding of human rights among students through a study of specific issues in a comparative perspective. • To anchor all issues in the Indian context and pulls out another country to form a broader comparative frame. • To learn about the concepts of Human Rights. • To attain knowledge on various issues that are seen related to the human rights violations. • To present before the students a comparative analysis of the state of Human Rights in different states. **Learning outcome:** • The student will be able to explain the meaning of human rights and examine human rights issues in different social, political, and cultural contexts. • The students will be able to relate human rights with other rights of individuals. • They will come to know how ideologies which seek to create hegemony; religious or political, pose threats to the human rights of individuals.
POLDSE02	Development Process and Social Movements in Contemporary India	• to introduce students to the conditions, contexts and forms of political contestation over development paradigms and their bearing on the retrieval of democratic voice of citizens. • The course analyses the various developmental processes in India post-Independence and how these processes affect the power dynamics in modern India.

		Learning outcome: • The student will be able to understand the influence of globalization on development processes in India.
POLDSE03	Public Policy in India	• This paper deals with the concept of Public Policy Analysis and the methods that can be employed for the analysis. • Also the students can relate the public policy analysis with the political economy. **Learning outcome:** • Students will be able to explain about different theories on Public Policy. • They will be able to explain how to design a good public policy. • They will be able to answer what is needed to ensure the successful implementation of public policy. • They will be able to critically examine and answer questions pertaining to some of the key public policies in India in respect of food, sanitation, health, education, poverty, education, and environment. • They will come to know how citizens can effectively participate in public policy implementation.
POLDSE04	Understanding Global Politics	• to provide students a basic yet interesting and insightful way of knowing and thinking about the world around them. **Learning Outcome:** • Students will be able to understand that what makes the world? • they can conceptualize the world. • they can think about the ‘world' as a whole from alternate vantage points.

D) <u>Ability Enhancement- (AE Skill Based)</u>

POLSEC01 Public Opinion and Survey Research

- To equip students with concepts, skills, and methods to understand public opinion and voting behavior in the political system.
- To train students with skills and methods of data collection, their processing with the application of new technology and precise statistical tools.
- To provide hands - on learning to the students to interpret election data and predicting of electoral fortunes of the parties based on inputs from the field.

Learning outcome:

- Students would learn the methods and techniques of data collection from the field.
- They would know where and how to apply the statistical tools like mean, median, mode, standard deviation, and correlational research.
- They will be able to predict the results of the election based on data applying the techniques of election data.

POLSEC02 Legislative Practices and Procedures

- To acquaint the student broadly with the legislative process in India to provide elementary skills to be part of a legislative support team and expose them to real life legislative work.
- To understand complex policy issues, draft new legislation, track and analyse ongoing bills, make speeches and floor statements, write articles and press releases, attend legislative meetings, conduct meetings with various stakeholders, monitor media and public developments, manage constituent relations and handle inter-office

communications.

- To deepen Students understanding and appreciation of the political process and indicate the possibilities of making it work for democracy.

Learning Outcome:

- Students will be able to know how the bills are drafted and presented in the parliament and state legislatures and what are the stages they pass through before becoming a law.
- Students will be able to know about the role of the legislature in the parliament and what are the research inputs they need to make an effective contribution to the parliamentary debates and legislative businesses.
- The students would know how to scan and filter out media reports and use them for legislative inputs.

Department of Commerce

ACCOUNTS HONOURS

Vision

Transforming individuals and communities through learning.

Mission

- Creating healthy environment for teaching, learning and research activities.
- Generating and providing resources and facilities to the faculty and the students for generating innovative ideas.
- Creating an urge in students to take up entrepreneurship in order to be successful by standing on their feet instead of being dependent on others.

PROGRAMME OUTCOME [B.Com (Hon.)]

PO – 1: After completing three years for Bachelors in Commerce (B.Com) program, students would gain a thorough grounding in the fundamentals of Commerce and Finance.

PO – 2: The commerce and finance focused curriculum offers a number of specializations and practical exposures which would equip the student to face the modern-day challenges in commerce and business.

PO -3 The all-inclusive outlook of the course offer a number of value based and job oriented courses ensures that students are trained into up-to-date.

Program Specific Outcome (PSO) [B.Com (Hon.)]

PSO – 1: Students will learn relevant financial accounting career skills, applying both quantitative and qualitative knowledge to their future careers in business.

PSO – 2: Students will learn relevant managerial accounting career skills, applying both quantitative and qualitative knowledge to their future careers in business.

PSO – 3: Learners will gain thorough systematic and subject skills within various disciplines of commerce, business, accounting, economics, human resource management, finance, auditing and marketing.

PSO – 4: Learners will be able to recognise features and roles of businessmen, entrepreneur, managers, consultant, which will help learners to possess knowledge and other soft skills and to react aptly when confronted with critical decision making.

PSO–5: Learners will be able to prove proficiency with the ability to engage in competitive exams like CA, CS, ICWA and other courses.

PSO – 6: Learners will acquire the skills like effective communication, decision making, problem solving in day to day business affaires

PSO – 7: Learners will involve in various co-curricular activities to demonstrate relevancy of foundational and theoretical knowledge of their academic major and to gain practical exposure.

PSO – 8: Learners can also acquire practical skills to work as tax consultant, audit assistant and other financial supporting services.

PSO -9: Learners will be able to do higher education and advance research in the field of commerce.

PSO – 10: Students will be able to demonstrate progressive learning of various tax issues and tax forms related to individuals. Students will be able to demonstrate knowledge in setting up a computerized set of accounting books.

PSO – 11: Students will demonstrate progressive affective domain development of values, the role of accounting in society and business.

Course Objectives B.Com. (Hons.):

Semester – I

Paper – 1.1 Environmental Studies

Objecitives: To understand the importance of ecological balance for sustainable development, the impacts of developmental activities and mitigation measures .

Paper – 1.2: FINANCIAL ACCOUNTING

Objective: The objective of this paper is to help students to acquire conceptual knowledge of the financial accounting and to impart skills for recording various kinds of business transactions.

Paper – 1.3: BUSINESS LAW

Objective: The objective of the course is to impart basic knowledge of the important business laws along with relevant case law. The students would be able to apply tools of consumer behavior and firm theory to business situations.

Paper 1.4 : MICRO ECONOMICS

Objectives: To understand and appreciate the basic Micro economics and their application to the business.

Semester – II

Paper 2.1: BUSINESS COMMUNICATION (In English)

Objective: To equip students of the B.Com (Hons.) course effectively to acquire skills in reading, writing, comprehension and communication, as also to use electronic media for business communication.

Paper – 2.2: MANAGEMENT PRINCIPLES AND APPLICATION

Objective: The objective of the course is to provide the student with an understanding of basic management concepts, principles and practices.

Paper 2:3: CORPORATE LAWS

Objective:To impart basic knowledge of the provisions of the Companies Act, 2013 and the Depositories Act, 1996. Case studies involving issues in corporate laws are required to be discussed.

Paper – 2.4: BUSINESS STATISTICS

Objective: The objective of this course is to familiarize students with the basic statistical tools used to summarize and analyze quantitative information for decision making.

Semester – III

Paper 3.1: BUSINESS MATHEMATICS

Objective: The objective of this course is to familiarize the students with the basic mathematical tools with emphasis on applications to business and economic situations.

Paper 3.2: INCOME TAX LAW AND PRACTICE

Objective: To provide basic knowledge and equip students with application of principles and provisions of Income-tax Act, 1961.

Paper 3.3: HUMAN RESOURCE MANAGEMENT

Objective: To familarise students with the Human Resources management involving planning, placement and training, significance of performance appraisal, methods of compensation etc..

Paper 3.4: MACRO ECONOMICS

Objectives: The course aims at providing the student with knowledge of basic concepts of the macro economics. The modern tools of macro-economic analysis are discussed and the policy framework is elaborated, including the open economy.

Paper 3.5: E-Commerce

Objectives: A student should become familiar with mechanism for conducting business transactions through electronic means

Semester – IV

Paper 4.1: INDIRECT TAXES

Objective: To provide basic knowledge and equip students with application of principles and provisions of Service Tax, VAT, Central Excise, and Customs Laws.

Paper 4.2: CORPORATE ACCOUNTING

Objectives: To help the students to acquire the conceptual knowledge of the corporate accounting and to learn the techniques of preparing the financial statements.

Paper – 4.3: COMPUTER APPLICATIONS IN BUSINESS

Objectives: To provide computer skills and knowledge for commerce students and to enhance the student's understanding of usefulness of information technology tools for business operations.

Paper 4.4: INDIAN ECONOMY – PERFORMANCE AND POLICIES

Objectives: This course seeks to enable the student to grasp the major economic problems in India and their solutions. It also seeks to provide an understanding of modern tools of macro-economic analysis and policy framework.

Paper 4.5: Entrepreneurship

Objective: The purpose of the paper is to orient the learner toward entrepreneurship as a career option and creative thinking and behavior for effectiveness at work and in life.

Semester – V

Paper 5.1: COST AND MANAGEMENT ACCOUNTING

Objective: To acquaint the students with basic concepts used in cost and management accounting and various methods involved in cost ascertainment systems.

Paper 5.2: PRINCIPLES OF MARKETING

Objective: The objective of this course is to provide basic knowledge of concepts, principles, tools and techniques of marketing.

Paper 5.3: FINANCIAL MANAGEMENT

Objective: To familiarize the students with the principles and practices of financial management.

Paper 5.4 : ORGANISATIONAL BEHAVIOUR

Objective: The objective of the course is to develop a theoretical understanding among students about the structure and behaviour of organization as it develops over time. The course will also make them capable of realizing the competitiveness for firms.

Semester – VI

Paper 6.1 : AUDITING AND CORPORATE GOVERNANCE

Objective: To provide knowledge of auditing principles, procedures and techniques in accordance with current legal requirements and professional standards.

Paper 6.2 : BUSINESS RESEARCH METHODS AND PROJECT WORK

Objective: This course aims at providing the general understanding of business research and the methods of business research. The course will impart learning about how to collect, analyze, present and interpret data.

Paper 6.3: INTERNATIONAL BUSINESS

Objective: The objective of the course is to expose students to the concept, importance and dynamics of international business and India's involvement with global business operations. The course also discusses theoretical foundations of international business to the extent these are relevant to understand the mechanics of global business operations and development.

Paper 6.4 : Consumer Affairs and Customer Care

Objective: This paper seeks to familarise the students with of their rights as a consumer, the social framework of consumer rights and legal framework of protecting consumer rights. It also provides an understanding of the procedure of redressal of consumer complaints, and the role of different agencies in establishing product and service standards. The student should be able to comprehend the business firms' interface with consumers and the consumer related regulatory and business environment.

Programme Outcomes – UG –Job –oriented Self-financed andB.Voc(Arts/ Science/ Commerce)

- *To promote entrepreneurship so as to establish and sustain working relations with coworkers, supervisors, clients, customers, and consumers using leadership and teamwork abilities.*
- *To create innovative products and services that are in line with changing market demands*
- *To apply business ethics and worldwide corporate responsibility standards*
- *To plan, direct, implement and assess individual and team projects*
- *To develop competencies to collect, evaluate, process and analyze data for supporting national and international business*

- *To equip the students with cognitive skills to successfully convey business issues, management principles, and decisions both in oral and written form using proper supportive technologies*
- *To train the students to demonstrate the skills needed to integrate cross-functional business knowledge and technologies to real-world situations*

Department of Computer Science

Vision

- To be a department of academic excellence dedicated to providing high-quality education in computer science and associated subjects, with a comprehensive focus on improving people's lives, society, and environment.
- To educate and train the next generation of high-quality information technology professionals to meet the industry's needs.

Mission

- To prepare students to be successful, ethical, and effective problem solvers as well as life-long learners who will positively contribute to the nation's economic well-being.
- To deliver high-quality education in order to meet the demands of the profession and society.
- To create a professional learning environment in which students can develop innovative and problem-solving skills.
- To improve the Industry Institute Interaction programme in order to become more familiar with the corporate culture.
- To equip students with the skills they'll need to succeed in today's fast-paced technology environment.
- To encourage the development of computer-related abilities that may be applied immediately to other areas of the curriculum.
- To assist students in the development and application of problem-solving abilities.

COMPUTER APPLICATION HONOURS

Vision

Through its quality teaching, the department of B.Sc.(Computer Application) strives to establish an intellectual environment that supports the search for new information in a rapidly dynamic computer world.

Mission

The B.Sc. (Computer Application) focuses on comprehensive, interdisciplinary computer application training, allowing students to understand and implement new advances as the area evolves.

Program Specific Outcomes

PSO 1 : Understand the fundamentals of digital fundamentals, object-oriented programming concepts, databases, microprocessor and assembly languages, and web and other applications.

PSO 2 : With the help of a visual programming environment, learn standard software engineering and project management techniques in software development.

PSO 3 : Demonstrate a comprehension of the software aspects of computer systems, including their values and how they work.

PSO 4 : Acquire the ability to plan and develop computer programmes, assess and identify potential dangers, and offer pioneering solutions.

PSO 5 : Discover technical knowledge in a variety of Computer Applications fields, as well as an atmosphere that aids in the development of skills for a successful career.

PSO 6 :Acquire expertise in generating successful pioneering solutions for real-world business and business development difficulties, with a desire for quality, capability, and a comprehensive approach.

PSO 7 : Attain the ability to integrate new technologies and regularly upgrade their abilities while maintaining an attitude of self-directed learning.

Course Outcomes :

Semester – I

Core Paper C-I (A) :PROGRAMMING USING C/C++

The course is meant to provide a thorough understanding of the C/C++ programming language. Students will be able to design logics that will aid them in creating C/C++ programmes and applications. They will be able to quickly switch to any other programme in the future if they master the basic programming constructs of C/C++.

Core Paper C-I (B) :PROGRAMMING USING C/C++ LAB

The course is meant to give students hands-on experience with the C/C++ programming language. They will create programmes and apps utilizing basic programming structures.

Core Paper C-II : DISCRETE STRUCTURE

The goal of the course is to make students to able to explain and use discrete mathematics approaches in Computer Science. It will also assist students in reasoning logically about various data types and structures utilized in computer algorithms and systems, such as numbers, sets, graphs, and trees. Students will also be able to use analytic approaches to model and analyze computational processes.

Semester – II

Core Paper C-III (A) : PROGRAMMING USING JAVA

This course covers the fundamentals of Object-Oriented Programming in Java. Students should understand the many models of object-oriented programming, such as abstract data types, inheritance, encapsulation, and polymorphism, by the end of the course.

Core Paper C-III (B) : PROGRAMMING USING JAVA LAB

This course gives you hands-on experience with Java Object Oriented Programming. Students will be able to create applications that incorporate abstract data types, inheritance, encapsulation, and polymorphism, among other concepts.

Core Paper C-IV (A) : PROGRAMMING USING DATA STRUCTURE

To determine the impact of data structures and algorithm design methodologies on programme performance. It will aid in the solution of problems involving data structures like as linear lists, stacks, queues, binary trees, graphs, and so on, as well as the creation of programmes to implement these solutions.

Core Paper C-IV (B) : PROGRAMMING USING DATA STRUCTURE LAB

The goal of this course is to provide students hands-on experience with data structures including linear lists, stacks, queues, binary trees, and graphs to solve issues.

Semester – III

Core Paper C-V (A) : COMPUTER SYSTEM ARCHITECTURE

The goal of this course is to teach students about the hardware, logic, fundamental structure, and behaviour of the many functional components of a computer, as well as how they interact to meet the user's processing demands.

Core Paper C-V (B) : COMPUTER SYSTEM ARCHITECTURE LAB

The goal of the course is to teach students about the computer instructions and mnemonics used in computer architecture, and then to use C to create programmes that replicate various machines utilizing the computer instructions (Memory Reference, Register Reference, and Input/Output Instructions).

Core Paper C-VI (A) : OPERATING SYSTEM

Process control, threads, concurrency, memory management scheduling, I/O files, distributed systems, and security are among the topics covered in this course. It will assist in determining whether a computer-based system, process, component, or application meets the desired requirements.

Core Paper C-VI (B) : OPERATING SYSTEM LAB

The objective of this course is to provide students with hands-on experience with process control, threads, concurrency, memory management scheduling, I/O files, distributed systems, and security.

Core Paper C-VII (A) : COMPUTER NETWORKS

The objective of this course is to assist students get a theoretical grasp of data communication and computer networks as well as practical experience with installation, monitoring, and troubleshooting.

Core Paper C-VII (B) : COMPUTER NETWORKS LAB

The objective of this course is to familiarize students with basic network administration commands, as well as to help them comprehend the network environment, visualize a network topology, and evaluate its performance. They'll also learn how to assess traffic flow and protocol frame contents, as well as design and configure a network for an enterprise.

Skill Enhancement Course SEC-I : HTML

The objective of this course is to acquaint the students with client-server architecture and to teach them how to develop and analyze web pages, as well as identify its elements and features.

Semester – IV

Core Paper C-VIII (A) : DESIGN AND ANALYSIS OF ALGORITHM

The objective of this course is to demonstrate innovative and efficient problem-solving techniques using various problem-solving models. To tackle a variety of problems, numerous algorithms will be designed and analyzed.

Core Paper C-VIII (B) : DESGIN AND ANALYSIS OF ALGORITHM LAB

The objective of this course is to teach students how to design and implement various data structure operations such as searching, insertion, and deletion, as well as traversing mechanisms.

Core Paper C-IX (A) :SOFTWARE ENGINEERING

The objective of this course is to assist students in developing skills that will enable them to generate high-quality software that is easy to understand, alter, and maintain.

Core Paper C-IX (B) :SOFTWARE ENGINEERING LAB

The purpose of this course is to educate basic UML principles, as well as to master the UML's vocabulary, conventions, and idioms, and to learn how to model it efficiently. Students will also be able to use the UML to tackle a variety of modelling challenges.

Core Paper C-X (A) : DATABASE MANAGEMENT SYSTEM

The purpose of this course is to teach students about the importance of a database management system in an organisation. It will also assist them in comprehending essential database principles, such as the relational data model's structure and operation.

Core Paper C-X (B) : DATABASE MANAGEMENT SYSTEM LAB

The objective of this course is to teach students how to use Structured Query Language(SQL) to create both simple and complicated database queries. It will teach students how to use SQL in stored procedures, functions, packages, and triggers to retrieve, update, and display data.

Skill Enhancement Course SEC-II : PL/SQL

The course objective is make students able to develop both simple and advanced database queries using Structured Query Language (SQL). It will help the students to retrieve, update and display data using SQL integrated into stored procedures, Functions, Packages and Triggers.

Semester – V

Core Paper C-XI (A) : INTERNET TECHNOLOGIES

The purpose of this course is to teach the fundamentals of publishing information on the Internet. The student will be familiar with client-server architecture and will be able to create a web application using Java. Students will receive the necessary skills and project-based experience to pursue professions in web application and development.

Core Paper C-XI (B) : INTERNET TECHNOLOGIES LAB

The purpose of this course is to give students hands-on experience in order for them to gain knowledge and abilities in the building of web sites from both the client and server perspectives. Students will learn how to write Javascript code and will also be introduced to JSP and JDBC.

Core Paper C-XII (A) : ARTIFICIAL INTELLIGENCE

The objective of this course is to give students an overview of Artificial Intelligence techniques and principles. It will also aid in the development of an understanding of the AI building blocks as they are presented in terms of intelligent agents, such as search, knowledge representation, inference, logic, and learning.

Core Paper C-XII (B) : ARTIFICIAL INTELLIGENCE LAB

The objective of this course is to familiarize students with PROLOG programming and to assist them in developing and executing programming utilizing PROLOG's numerous constructions and logics.

Discipline Specific Elective DSE-I (A) : WINDOWS PROGRAMMING USING VISUAL BASIC.NET

The objective of this course is to teach students how to utilize Visual Basic.Net to create Windows applications that leverage structured and object-based programming techniques. Students will be able to assess programme requirements, create programmes with graphical user interfaces, and test existing code in order to improve it.

Discipline Specific Elective DSE-I (B) : WINDOWS PROGRAMMING USING VISUAL BASIC.NET LAB

The purpose of this course is to provide students with practical experience with Visual Basic.Net. Students will use structured and object-based programming techniques to create Windows applications.

Discipline Specific Elective DSE-II (A): OPERATION RESEARCH

The course's objective is to teach students how to use the fundamentals of operations research to solve problems using a mathematical approach to decision making. It will assist students in using numerical tools and approaches for making decisions, constructing models, and applying them to business decision issues.

Discipline Specific Elective DSE-II (B): OPERATION RESEARCH LAB

The objective of this course is to prepare students for a variety of operations research challenges, such as solving a linear programming problem utilizing the graphical technique, branch and bound method, simplex method, dual simplex method, M-charnes method, Two phase method, and so on.

Semester – VI

Core Paper C-XIII : THEORY OF COMPUTATION

The objective of this course is to develop a mathematical view of algorithmic design and computation by establishing a correct relationship between algorithmic problem solving and the theory of languages and automata.

Core Paper C-XIV (A) : COMPUTER GRAPHICS

The objective of this course is to provide students with hands-on experience with interactive computer graphics and the use of a graphics application programming interface. In this course, students will learn about all aspects of computer graphics, including hardware, software, and applications.

Core Paper C-XIV (B) : COMPUTER GRAPHICS LAB

The objective of this course is to provide practical exposure to students on computer graphics by teaching them how to build and implement algorithms like Bresenham's Line Drawing, Mid-Point Circle Drawing, Cohen and Sutherland line clipping, scan line fill, and so on.

Discipline Specific Elective DSE-III (A): ECOMMERCE AND PHP PROGRAMMING

The objective of Ecommerce is to teach students about the impact of electronic commerce on businesses, governments, and consumers. It will also provide an awareness of the many types of business models and their major components in the new economy. PHP programming will provide with the skills you'll need to create dynamic, database-driven web pages. Students will be introduced to PHP's foundation and syntax, as well as key strategies for creating dynamic web sites.

Discipline Specific Elective DSE-III (B): ECOMMERCE AND PHP PROGRAMMING LAB

The objective of this course is to acquaint the students with the various components and logics of PHP programming and to assist them in developing simple PHP programmes.

Discipline Specific Elective DSE-IV : DISSERTATION/PROJECT

The objective of the dissertation/project is for the student to get a deeper understanding, knowledge, and capabilities in the context of the programme of study by exposing them to practical situations. It will also allow students to conduct in-depth research in an area of interest while also allowing them to demonstrate skills and knowledge gained throughout their undergraduate programme.

INFORMATION TECHNOLOGY HONOURS

Vision

The B.Sc.(Information Technology) department aspires to develop prominent graduates who are well-versed in the latest technologies and tools, as well as exceptional professionals in the field of computer science to serve industry and society.

Mission

The objective of the B.Sc.(Information Technology) programme is to deliver high-quality education that is associated with industry needs and to provide technical knowledge through a well-organized teaching-learning process.

Program Specific Outcomes

PSO 1 : Programming, multimedia, animation, web development, networking, and domain-based electives are among the skills that have been acquired.

PSO 2 : Understand and apply modern computer languages and applications to build platforms for a successful profession and further education.

PSO 3 : Develop skills in areas such as information technology and its enabled services, government and private sector, research, and teaching.

PSO 4 : Understand and be able to design, develop, and provide software solutions to meet the needs of industry.

PSO 5 : Use the most up-to-date approaches, skills, and tools for computing.

PSO 6 : Build software systems in groups and apply the technologies to a variety of computer-related challenges, such as hardware issues, web site development, databases, and other software engineering methodologies.

Course Outcomes :

Semester – I

Core Paper C-I (A) :PROGRAMMING USING C/C++

The course is meant to provide a thorough understanding of the C/C++ programming language. Students will be able to design logics that will aid them in creating C/C++ programmes and applications. They will be able to quickly switch to any other programme in the future if they master the basic programming constructs of C/C++.

Core Paper C-I (B) :PROGRAMMING USING C/C++ LAB

The course is meant to give students hands-on experience with the C/C++ programming language. They will create programmes and apps utilizing basic programming structures.

Core Paper C-II : DISCRETE STRUCTURE

The goal of the course is to make students to able to explain and use discrete mathematics approaches in Computer Science. It will also assist students in reasoning logically about various data types and structures utilized in computer algorithms and systems, such as numbers, sets, graphs, and trees. Students will also be able to use analytic approaches to model and analyze computational processes.

Semester – II

Core Paper C-III (A) : PROGRAMMING USING JAVA

This course covers the fundamentals of Object-Oriented Programming in Java. Students should understand the many models of object-oriented programming, such as abstract data types, inheritance, encapsulation, and polymorphism, by the end of the course.

Core Paper C-III (B) : PROGRAMMING USING JAVA LAB

This course gives you hands-on experience with Java Object Oriented Programming. Students will be able to create applications that incorporate abstract data types, inheritance, encapsulation, and polymorphism, among other concepts.

Core Paper C-IV (A) : PROGRAMMING USING DATA STRUCTURE

To determine the impact of data structures and algorithm design methodologies on programme performance. It will aid in the solution of problems involving data structures like as linear lists, stacks, queues, binary trees, graphs, and so on, as well as the creation of programmes to implement these solutions.

Core Paper C-IV (B) : PROGRAMMING USING DATA STRUCTURE LAB

The goal of this course is to provide students hands-on experience with data structures including linear lists, stacks, queues, binary trees, and graphs to solve issues.

Semester – III

Core Paper C-V (A) : COMPUTER SYSTEM ARCHITECTURE

The goal of this course is to teach students about the hardware, logic, fundamental structure, and behaviour of the many functional components of a computer, as well as how they interact to meet the user's processing demands.

Core Paper C-V (B) : COMPUTER SYSTEM ARCHITECTURE LAB

The goal of the course is to teach students about the computer instructions and mnemonics used in computer architecture, and then to use C to create programmes that replicate various machines utilizing the computer instructions (Memory Reference, Register Reference, and Input/Output Instructions).

Core Paper C-VI (A) : OPERATING SYSTEM

Process control, threads, concurrency, memory management scheduling, I/O files, distributed systems, and security are among the topics covered in this course. It will assist in determining whether a computer-based system, process, component, or application meets the desired requirements.

Core Paper C-VI (B) : OPERATING SYSTEM LAB

The objective of this course is to provide students with hands-on experience with process control, threads, concurrency, memory management scheduling, I/O files, distributed systems, and security.

Core Paper C-VII (A) : COMPUTER NETWORKS

The objective of this course is to assist students get a theoretical grasp of data communication and computer networks as well as practical experience with installation, monitoring, and troubleshooting.

Core Paper C-VII (B) : COMPUTER NETWORKS LAB

The objective of this course is to familiarize students with basic network administration commands, as well as to help them comprehend the network environment, visualize a network topology, and evaluate its performance. They'll also learn how to assess traffic flow and protocol frame contents, as well as design and configure a network for an enterprise.

Skill Enhancement Course SEC-I : HTML

The objective of this course is to acquaint the students with client-server architecture and to teach them how to develop and analyze web pages, as well as identify its elements and features.

Semester – IV

Core Paper C-VIII (A) : DESIGN AND ANALYSIS OF ALGORITHM

The objective of this course is to demonstrate innovative and efficient problem-solving techniques using various problem-solving models. To tackle a variety of problems, numerous algorithms will be designed and analyzed.

Core Paper C-VIII (B) : DESGIN AND ANALYSIS OF ALGORITHM LAB

The objective of this course is to teach students how to design and implement various data structure operations such as searching, insertion, and deletion, as well as traversing mechanisms.

Core Paper C-IX (A) :SOFTWARE ENGINEERING

The objective of this course is to assist students in developing skills that will enable them to generate high-quality software that is easy to understand, alter, and maintain.

Core Paper C-IX (B) :SOFTWARE ENGINEERING LAB

The purpose of this course is to educate basic UML principles, as well as to master the UML's vocabulary, conventions, and idioms, and to learn how to model it efficiently. Students will also be able to use the UML to tackle a variety of modelling challenges.

Core Paper C-X (A) : DATABASE MANAGEMENT SYSTEM

The purpose of this course is to teach students about the importance of a database management system in an organisation. It will also assist them in comprehending essential database principles, such as the relational data model's structure and operation.

Core Paper C-X (B) : DATABASE MANAGEMENT SYSTEM LAB

The objective of this course is to teach students how to use Structured Query Language (SQL) to create both simple and complicated database queries. It will teach students how to use SQL in stored procedures, functions, packages, and triggers to retrieve, update, and display data.

Skill Enhancement Course SEC-II : XML

The objective of this course is to make students gain practical expertise with XML, schemas, XSLT, and XML publishing through understanding the evolution, theoretical context, and application of XML. The course also teaches students how to recognize the relationship between XML and metadata, as well as how to use XML in a broader context on the internet.

Semester – V

Core Paper C-XI (A) : INTERNET TECHNOLOGIES

The course objective is to teach the basics involved in publishing content on the World Wide Web. The student will be acquainted with the client server architecture and able to develop a web application using java technologies. Students will be able to gain the skills and project based experience needed for entry into web application and development careers.

Core Paper C-XI (B) : INTERNET TECHNOLOGIES LAB

The course objective is to provide practical exposure to the students to acquire knowledge and skills for creation of web site considering both client and server side. The students will know how to develop javascript codes and will also learn about JSP and JDBC.

Core Paper C-XII (A) : ARTIFICIAL INTELLIGENCE

The course objective is to help the student to have an overview of Artificial Intelligence approaches and principles. It will also assist in developing the understanding of the building blocks of AI as presented in terms of intelligent agent ie. search, knowledge representation, inference , logic and learning.

Core Paper C-XII (B) : ARTIFICIAL INTELLIGENCE LAB

The course objective is to make the students aware about PROLOG programming and help them to develop and execute programming using various constructs and logics of PROLOG programming.

Discipline Specific Elective DSE-I (A) : WINDOWS PROGRAMMING USING VISUAL BASIC.NET

The course objective is to help the students use Visual Basic.Net to build Windows Applications using structured and object-based programming techniques. Students will be able to analyze program requirements, develop programs with GUI interfaces and perform tests to revise existing code.

Discipline Specific Elective DSE-I (B) : WINDOWS PROGRAMMING USING VISUAL BASIC.NET LAB

The course objective is to help the students to have practical exposure on Visual Basic.Net. The students will build Windows Applications using structured and object-based programming techniques.

Discipline Specific Elective DSE-II (A): OPERATION RESEARCH

The objective of the course is to make the students use the basic tolls of Operations Research in solving the problems using mathematical approach for decision making. It will help the students to use numerical methods and techniques for decision making, formulating the model and applications that are used in solving business decision problems.

Discipline Specific Elective DSE-II (B): OPERATION RESEARCH LAB

The course objective is to prepare the students for various operation research problems such as solving a linear programming problem using graphical method, branch and bound method, simplex method, dual simplex method, M-charnes method, Two phase method, etc.

Semester – VI

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The purpose of this course is to give students hands-on experience in order for them to gain knowledge and abilities in the building of web sites from both the client and server perspectives. Students will learn how to write Javascript code and will also be introduced to JSP and JDBC.

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Discipline Specific Elective DSE-I (B) : WINDOWS PROGRAMMING USING VISUAL BASIC.NET LAB

The purpose of this course is to provide students with practical experience with Visual Basic.Net. Students will use structured and object-based programming techniques to create Windows applications.

Discipline Specific Elective DSE-II (A): OPERATION RESEARCH

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Discipline Specific Elective DSE-III (B): ECOMMERCE AND PHP PROGRAMMING LAB

The objective of this course is to acquaint the students with the various components and logics of PHP programming and to assist them in developing simple PHP programmes.

Discipline Specific Elective DSE-IV : DISSERTATION/PROJECT

The objective of the dissertation/project is for the student to get a deeper understanding, knowledge, and capabilities in the context of the programme of study by exposing them to practical situations. It will also allow students to conduct in-depth research in an area of interest while also allowing them to demonstrate skills and knowledge gained throughout their undergraduate programme.

Programme- B.Com (Advertising & Marketing)

Programme Outcome

PO 1- Business Idea Generation*:*

Such professional programme enables the students to acquire theoretical and practical knowledge for developing various business ideas.

PO 2- Development of Business Leadership*:*

It helps in personality development and excels in communication skills

PO 3- Development of Business Competency*:*

Development of professional competence amongst the students as per the suitability of industry and commerce.

PO 4- Industry and Commerce Interactive Process*:*

Platform to interact with the corporate and understand the industrial practices, value and ethics.

PO 5- Developments of Business Knowhow's*:*

Makes students industry ready and develops various managerial and accounting skills for better professional opportunities during on-job training.

Programme Specific Outcome

PSO1*. This course offers students to develop their knowledge and skills in all aspects of advertising and marketing activities*

PSO2. *Helps to understand the behavior of consumers and how the relationship between the buyer and seller impacts the business*

PSO3. *Helps the students to understand how organize and manage the various events*

PSO4*. Course also offers the students to use the computer application in Ad & Marketing*

PSO5.*Train the students on supply chain management and logistic.*

PSO6*. Deliver knowledge about media and marketing laws.*

Course Outcome

CO 1- P*rovide the working knowledge of different concepts of marketing and their use in managerial decision.*

CO 2-*Students should be aware about the communication and its importance in the fields of marketing by describing various mix and models of communication. The effects of communication over the proposed buyers/consumers are to describe fully.*

CO 3- *Develops students to the theory, fundamental and tool of general communication and to develop in them vital communication skills which should be integral to personal, social and professional interaction.*

CO 4-*Develops students familiar with generally accepted accounting principles of financial accounting and their applications in business organizations excluding corporate entities.*

CO 5- *Understand the role of media in advertising and marketing with its advantages and disadvantages. The functional aspects are also to be understood for proper application of media in general and digital marketing system.*

CO 5- *Provide an understanding with the special system of marketing with its various functional systems. This is also provides an insight in the operation area of retail marketing and its associated functionaries.*

CO 6*-Provide necessary knowledge to students regarding international marketing*
CO 7*- Acquaint students with basic concepts used in cost and management accounting and various methods involved in cost ascertainment system.*
CO 8*- Providing knowledge regarding behavioral aspects of consumers by identifying various elements. It also develops the students' concepts about the application of behavioral tools in the buying process of the consumer.*
CO 9*- Providing knowledge regarding event management and emerging fields of rural marketing.*
CO 10*- Providing scopes of On the Job Training to students for finds out opportunities in the fields of advertising and marketing.*

Programme: B.Com (Office Management & Secretarial Practice)

Programme Outcome

PO 1-Human Resource Management*-*

Human resource applications and knowledge for various fields of management, corporate affairs, trade and commerce.

PO 2-Counseling and Negotiation*-*

Various areas of counseling & negotiations operating systems are analyzed for developing different aspects of it in respects to different organizations.

PO 3- Human Resources for NGOs*-*

Human resource management and applications for nonprofit organizations.

PO 4- Modern office administration and management

Develops competencies in modern office management & Administration

Programme Specific Outcomes

PSO1.*Prepare students to handle effective management of common modern office environments.*
PSO2*.Manage human resources in the office including staffing, on-the-job employee practices, workforce improvement, customer handling conflict resolution, job stress, time management, as well as work ethics and business etiquette issues.*
PSO3. *Manage the trends and challenges of modern office systems as a result of new technology.*
PSO4.*To understands the importance of public relationship, counseling and negotiation management and the importance of customer relationship management.*
PSO5. *To understand the application of management information system*

Course Outcomes

CO 1*- Develops students for various management practices with its practical and theoretical applications*
CO 2*- Develops students for business communications systems.*
CO 3*- Develops competencies among students for counseling and negotiation systems.*
CO 4*- Develops awareness regarding various provisions of business laws.*
CO 5*- Providing working knowledge for Banking and Insurance sectors.*
CO 6*- Providing knowledge for enhancing capabilities of students regarding secretarial procedures as a company secretary.*

CO 7*- Develops students capabilities for data management through application of MS Office and Computer Accounting in Tally including Management Information Systems.*
CO 8*- Developing students for various scales of corporate governance.*
CO 9*- Develops students for public and customer relationships management for corporate and non corporate sectors.*
CO 10*- Develops students for corporate and financial reporting.*
CO 11*- Develops students capabilities as an entrepreneurships.*

Programme: B.Com (Banking & Insurance)

Programme Outcome:

PO 1- Concentrate on Banking Sector

Develop knowledge regarding opportunities and application of career prospective regarding banking sectors.

PO 2- Concentrate on Insurance Sector

Develop knowledge regarding opportunities and application of career prospective regarding insurance sectors.

PO 3- Concentrate on Stock Market Operations

Develop knowledge regarding opportunities and application of career prospective regarding stock market operations.

Programme Specific Outcome:

PSO1*. Make students learn banking operations, regulations, monetary auditing, selling of financial products and services.*
PSO2*. Provides knowledge regarding opportunities to explore many career paths like investment and portfolio management, stock market, security analysis, mutual fund and capital market analysis, accounting field, financial fields, wealth management etc.*
PSO3*.To gain knowledge about life insurance, general insurance, group insurance, health insurance, reinsurance and miscellaneous insurance.*
PSO4.*Develop students for Stock Market Trading and its related issues.*

Course Outcome:

CO 1*- Focus on the banking operation and management.*
CO 2*- Focus on the international banking and financial market operation.*
CO 3*- Focus on the Life insurance operation and management.*
CO 4*- Focus on the General Insurance operation and management.*
CO 5*- Focus on the Miscellaneous insurances like group insurance, retirement benefit schemes etc.*
CO 6*- Focus on the international banking operation and international financial markets.*
CO 7*- Focus on the portfolio management, mutual fund operation, wealth management, risk management etc.*
CO 8*- Focus on the entrepreneurship development and promote to set up startups ventures.*
CO 9*- Provide knowledge regarding different insurance and financial laws applicable for the insurance and banking sector.*

Programme: B.Com International Accounts

Programme Outcome

PO 1- International Financial Standards

This programme focuses on the different aspects of the international financial standards and its accounts systems.

PO 2- International financial markets

Create awareness regarding complex aspects of international market including different lending agencies and its operational systems.

PO 3- International finance

International financial dealing involves greater risk for debtors and creditors both due to various reasons including different socio-politico and financial environments. In this context it's very necessary to develops strategic attitude before investment and dealing with foreign investors and in foreign financial markets.

PO 4- International Taxing systems

Every country has its own taxing system, so knowledge regarding taxing system of different countries is very necessary in this regard.

Programme Specific Outcome

PSO1*. The programme aims to develop professional skills among students and build a strong foundation in international accounts, finance and ethics.*

PSO2*. It gives students theoretical and application-based knowledge in the financial sector and analytical skills to work with various financial tools, such as regulatory agencies and global markets.*

PSO3*.Inculcates knowledge of various accounting concepts and policies and introduces the students to working knowledge of Accounting Standards.*

PSO4*.To gives idea about role of ERP in finance.*

PO 5*- Provides adequate knowledge regarding international financial management.*

PO 6*- Provides adequate knowledge regarding international financial institution along with various treaties in between countries.*

Course Outcome:

CO 1*- Focuses on the international accounting systems.*

CO 2*- Focuses on the international financial standards and its operating systems.*

CO 3*- Focuses on the various bilateral and tripartite treaties among different countries and its effects on the international finance and accounting systems.*

CO 4*- Provide adequate knowledge regarding various corporate and business laws.*

CO 5*- Provide knowledge regarding strategic management and its application in international accounting and finance.*

CO 6*- Provide adequate knowledge regarding direct and indirect taxes applicable in international business transactions.*

CO 7*- Providing knowledge regarding strategic analysis of business.*

CO 8*- Providing knowledge regarding international banking systems and its effects in international financial systems.*

CO 9*- Focuses on the different international services.*

CO 10*- Focuses on the Entrepreneur Resource Planning and Finance.*
CO 11*- Provide adequate practical knowledge regarding operation and application of finance by placing students in On the Job Training Programme in various business organizations.*

Programme- Bachelor in Retail Management (BRM)

Programme Outcome

PO 1- Critical evaluation of retail sector

Retail is the most emerging sector today by providing fastest economical growth along with employment generation.

PO 2- Differentiate Retail sectors

Different types of organized retails are develops today, like food and grocery retail, gems and jewellary retail etc.

PO 3- Creates specialized manpower

It's creates specialized manpower for operation and management of retail sector. Due to tremendous growth opportunities now organized retail it's called future generation business.

Programme Specific Outcome*:*

PSO 1*- It focuses on the most emerging sector with higher growth and higher scopes of employment generation.*
PSO 2*- It focuses on different formats of organized retail.*
PSO 3*- Provide adequate knowledge regarding e-retailing and digital marketing.*
PSO 4*- Provides knowledge regarding international retailing.*
PSO 5*- Provides knowledge regarding manpower management in retail sectors.*

Course Outcome

CO 1*- Provide knowledge regarding retail store operation and management.*
CO 2*- Provide knowledge regarding retail consumer buying systems with its impacts.*
CO 3*- Provide knowledge regarding franchising systems in retail sector and its benefits in retail operation.*
CO 5*- Provides knowledge regarding different formats of retailing i.e. food and grocery retail, apparel retail, gems and jewellary retail, novelty retail etc.*
CO 6*- Provide knowledge regarding retail warehousing, logistics and supply chain systems.*
CO 7*- Enrich students regarding E-commerce and digital marketing in retail sector.*
CO 8*- Provides knowledge regarding mall management and its impacts for retail sector.*
CO 9*- Provides knowledge regarding retail customer service system and its impact on retail customers.*
CO 10*- Provides adequate knowledge regarding different retail laws and its impacts for the retail sectors.*
CO 11*- Provides knowledge regarding retail management information system.*
CO 12*- Provides knowledge regarding retail store design and layout system.*
CO 13*- Provides adequate scopes for On the Job Training Programme, so that students develops themselves in according to the various requirements of retail sectors.*

Programme: Bachelor in Financial Market Operation (BFMO)

Programme Outcome:

PO 1- Stock Market Analysis

Defining stock market analyzing and investment system for investors.

PO 2- Stock Market Regulatory System

Focuses on the different regulators i.e. National Stock Exchange, Bombay Stock Exchange, Security and Exchange Board of India with its regulatory and operational aspects.

PO 3- Investment Analysis

Focuses on the different aspects of investments through mutual funds, banking and insurance sectors.

PO 4- Analyzing Risk Management

Focuses on risk management for small as well as large investors. It also takes on different aspects of wealth management and its yielding systems for short as well as for long terms.

Programme Specific Outcome

PSO 1- Focuses on the banking operation and its investment systems.
PSO 2- Focuses on the Insurance sector and its investment systems.
PSO 3- Focuses on the regulatory and operational aspects of National Stock Exchanges
PSO 4- Focuses on the regulatory and operational aspects of Bombay Stock Exchanges
PSO 5- Focuses on the regulatory provisions of Security and Exchange Board of India.
PSO 6- Focuses on the regulatory aspects of Insolvency and Bankruptcy Board of India.

Course Outcome

CO 1- Provide adequate knowledge regarding financial sectors and its business systems.
CO 2- Provides knowledge regarding banking operations, investment and management systems.
CO 3- Provides knowledge regarding insurance sectors with its investment and operational systems.
CO 4- Provide knowledge regarding security analysis and script management.
CO 5- Provide knowledge regarding mutual funds investment and analysis system.
CO 6- Provide knowledge regarding building of portfolios and its market return system.
CO 7- Provide knowledge regarding insurance claim management and underwriting systems.
CO 8- Provides knowledge regarding commodity exchange markets and its operational systems.
CO 9- Provides knowledge regarding financial derivatives and its application systems.
CO 10-Provides adequate scopes for On the Job Training Programme, so that students develops themselves in according to the various requirements of financial sectors.

Programme: B.Voc. (Fashion Technology)

Programme Outcome

PO 1- Specialized Sector

Focuses on the very specialized textile and apparel sectors on the enormous opportunities.

PO 2- Second largest employment generation sector

Focuses on the professional expertise developments of students for various jobs available with different positions within manufacturing and in trading/retailing of textile and apparel.

PO 3- Thrust on design and fashion

Different sections of design and fashion styles are covered adequately including bifurcations of apparel for men's , women's and children's etc.

PO 4-Thrust of Fashion Machinery and its applications

Put up hand on expertise opportunities for operation of traditional and very specialized machines including design and development access.

Programme Specific Outcome

PSO 1- Special focuses on the developments of apparel design, illustrations and concept developments.

PSO 2- Focuses on to develop capabilities for various states of art machine operations.

PSO 3- Focuses on the apparel and textile merchandising.

PSO 4- Focuses on the traditional arts and color concepts through various workshops and seminars/webinars by professionals.

Course Outcome

CO 1*- Focuses on the history and traditional art forms for overall concept developments.*

CO 2*- Focuses on the traditional and sophisticated machine operation through hand on applications.*

CO 3 *– Focuses on the computer based illustrative systems through special software applications.*

CO 4*- Focuses on the developments of soft skills within students through classroom teaching, workshops and seminars.*

CO 5*- Focuses on the pattern making of apparel for men's women's and children's along with special dresses.*

CO 6*- Focuses on the Computer based Fashion CAD through hands on practical for overall developments of students.*

CO 7*- Special stresses are laying on in practical manufacturing of samples with draping and grading.*

CO 8*- Full stresses are gives on quality control aspects of apparel constructions.*

CO 9*- Provide ample scopes for visual merchandising and fashion photography with developments of portfolios for each and every students.*

CO 10*- Focuses on the garment coloring and cloth care aspects.*

CO 11*- Focuses on the Fashion event organizing and media management.*

CO 12*- Provides adequate scopes for summer internship and On the Job Training Programme, so that students develop themselves in according to the various requirements of fashion and apparel sectors.*

Programme- B.Voc. (Building Construction Management)

Programme Outcome

PO 1- Specialized Sector driven programme

Various specialized job requirements are fulfilled through this programme.

PO 2- Highest Employment generation sector

Construction industries generate highest employment opportunities in the country with unskilled, semi skilled, skilled and super specialty jobs.

PO 3- Defining future economic trends

Highest revenue generation sectors and it defines future trends in economic growths.

PO 4- Acquiring multispecialty techniques and technology applications

This sector considers as the highest technology driven sector its including traditional as well as application of states of art technologies in manufacturing of buildings and other constructions.

Programme Specific Outcome:

PSO 1- *This programme is considered with the stakeholders' involvements and industry partnership system for providing more practical exposures as in house and out of campus systems.*

PSO 2- *It's a very technology driven programme, so computer based learning is an integral part of it.*

PSO 3- *Modern instruments application and operation are considered as the most appreciable part of it.*

PSO 4- *Focuses on infrastructural construction and developments also.*

Course Outcome:

CO 1*- Focuses on the application of construction materials and applications.*

CO 2*- Focuses on the different aspects of civil constructions.*

CO 3*- Focuses on the civil structural system by the application of different technologies.*

CO 4- *Focuses on the construction related marketing aspects with its management for every quarter of civil constructions.*

CO 5*- Focuses on the manpower management of the construction industry at various levels.*

CO 6*- Focuses on the civil survey system through applications of different sophisticated instruments.*

CO 7*- Focuses on the project development, estimation and management system.*

CO 8*- Focuses on the quality aspect of civil material and applications.*

CO 9*- Special emphasis provided on the manufacturing of civil constructions by the applications of green technologies.*

CO 10*- Provides adequate scopes for summer internship and On the Job Training Programme, so that students develop themselves in according to the various requirements of construction industry.*

DEPARTMENT OF BIOTECHNOLOGY
ST. XAVIER'S COLLEGE, RANCHI, JHARKHAND

B. Sc Biotechnology Course Outcomes

Biotechnology is one of the most demanding areas in the industries like, Pharmaceutical, Food Processing, Agriculture and Medical Diagnostic. The revolution is going on in the industries for new technology introduction in the drug delivery system, preservation and processing of food, crops and pest management, genetic engineering, gene andstem cell therapy, more sophisticated and zero error diagnostic system. This course is the introduction door for the students who are aim their career in these fields.

PROGRAM SPECIFIC OUTCOMES

- The students will be able to understand the basic concepts of Life Sciences (Plant, Animal and Microbial).
- The students will be able to apply their knowledge of cell biology, chemistry, biochemistry and molecular biology to solve the problems related to the field of biotechnology.
- Students acquire knowledge and skills of various aspects of Microbiology, Immunology and Molecular Diagnostics to work in health industry.
- They will gain fundamental knowledge in Enzymology, Plant biotechnology and their applications.
- Students will be able to understand various fundamental aspects of Bioinformatics and basics of Genomics and Proteomics that could be applied for research and development in pharmaceutical industry.
- The students are trained to pursue further education or work in industry through project work.
- Student will be able to describe fundamental molecular principles of genetics, understand relationship between phenotype and genotype, how gene expression is regulated and fundamentals of recombinant DNA technology.
- The course also focuses to fundamental knowledge of Bioprecess Technology and Biostatistics and inculcate entrepreneurship among the students so as to start their own ventures in the field of Biotechnology.

COURSE	COURSE OUTCOMES
	After successful completion of this course students are expected to be able to
C1- Biochemistry and Metabolism	CO 1: Understand the major characteristic features of carbohydrates. CO 2: Discuss how the lipids are extracted from liver. CO 3: Classify the different labels of proteins.

	CO 4: Describes the different steps used in metabolism of glucose. CO 5: Write the different factors which affects enzyme activity. CO 6: Describe the major properties of standard amino acid. CO 7: Know about the hormones and write the important functions of hormones secreted by brain.
C2- Cell Biology	CO-1: Understand the basic structure and biochemistry of cell . CO-2: Basic difference between prokaryotic and eukaryotic cell CO-3: To know the structure of cell organelles (Plant & Animal). CO-4: To understand the basic and specialized function of cell organelles CO-5: Role of extracellular matrix: Composition, molecules that mediate cell adhesion, membrane receptors CO6: Receptors on cell, signaling molecules and pathways of Signal transduction CO7: About Cancer: Carcinogenesis, agents promoting carcinogenesis, characteristics and molecular basis of cancer.
C3- Mammalian Physiology	CO1 Describe the mechanism of digestion and absorption of various nutrient. CO2 Transport and exchange of oxygen and carbondioxide. CO3 Composition of blood and their role. C04 Mechanism of coagulation of blood. CO5 Working mechanism of heart, their origin and conduction CO6 Describe different types of muscles and their contraction mechanism. CO7 Write down the different modes of excretion. CO8 Explain the mechanism of urine formation. CO9 To study the mechanism of generation and propagation of nerve impulse. CO10 Write down the different types of endocrine glands and their mechanism of action.
C4- Plant Anatomy and Physiology	CO 1: Discuss different types of tissues in plants like Study of different types of meristematic and permanent tissues, their structure and functions. CO2: Define the primary structure of dicot and monocot root and stem using well labelled diagrams, leaf anatomy in dicot and monocot plants, Comparison between dicot and monocot root, stem and leaf anatomy. Study of secondary growth in plants and Study of occurrence of growth rings in plants. CO3: Discuss about plant water relations and importance of water to plant life, different transport processes in plants, i.e. diffusion and osmosis. CO4: Understand various physiological phenomena in plants (plasmolysis, imbibition, guttation, Transpiration). CO5: Write down criteria for essentiality of nutrients, study of micro and macro nutrients in plants, their roles and deficiency symptoms in plants

	and Role of phloem in food transport. CO6: Describe the concept of photosynthesis, light and dark reactions, photosynthetic pigments and their functions, antenna complex and Light Harvesting Complex (LHC) in plants. CO7: Explain how does photorespiration affect plants and adaptations of plants to this phenomenon (C4 and CAM plants). CO8: Understand nitrogen fixation, its types and different steps involved. Define Biological Nitrogen Fixation (BNF), Microorganisms involved in BNF and assimilation of ammonium and nitrate reduction in plants.
C5- Genetics	CO1 Discuss about the historical development in the field of genetics. CO2 Name the animals that are suitable organism for genetic experiment and their genetic significance. CO3 Discuss about the cell cycle and their checkpoints in yeast. CO4 Give a brief description of Mendelian genetics. CO5 Discuss about the chromosomal theory of inheritance. CO6 Discuss the concept of Allelic and Non-Allelic interactions. CO7 What are the Chromosome and Genomic organization of Eukaryotes, Prokaryotes, Viruses. CO8 Discuss about the unique and repetitive DNA. CO9 What is one gene one polypeptide hypothesis. CO10 Describe the chromosome and gene mutation. CO11 Discuss about the mechanism of sex determination and sex linkages. CO12 Describe the sex-linked inheritance. CO13 Discuss about the linkage and recombination of genes. CO14 What are the rules of extra nuclear inheritance. CO15 Discuss the Hardy Weinberg Law.
C6- General Microbiology	CO-1: Discuss history of Microbiology. CO-2: Understand basic structure of Bacterial cell & other prokaryotes. CO-3: Describe general structure & functions of Virus, Yeast, Protozoa. CO-4: Define the growth & nutrition of microbial cell and control methods. CO-5: Aware about general microbial culture, preservation and staining techniques. CO-6: Understand Transformation, Transduction and Conjugation. CO7: Describe endospores and sporulation in bacteria. CO8: Discuss importance of microorganism in fermented food, food born infections and intoxications. CO9: Explain bacterial pollutants of water, coliforms and non coliforms. CO10: Define Sewage composition and its disposal. .
C7- Chemistry-1 (Physical Chemistry)	CO 1: Define Atom? Discuss the important postulates of Dalton's Atomic Theory and its limitation CO 2: What is Empirical formula? Establish the Empirical and molecular

	formula with suitable example. (Simple numerical) CO 3: Define MOLE. Do some numerical problem based on mole concept. CO 4: Explain different concentration term of solution with suitable example. CO 5: What is Equivalent weight? How will you determine the equivalent weight of acid, base, salt, oxidizing agent and reducing agent? CO 6. What is Factor of the concentration term? Explain with example. CO 7: Define and explain mole faction with example. CO 8: Write notes on i) Normality ii) Molarity iii) Molality iv) Formality
SEC1- Enzymology	CO1: What are the methods for isolation, crystallization and purification of enzymes. CO2: Explain the Zymogens and their method of activation. CO3: Derive the Michaelis-Menten equation. CO4: Explain the mechanism of two substrate reaction CO5: Discuss the different strategies of Enzyme action. CO6: What are the techniques for studying mechanisms of action, chemical modification of active site of various enzymes. CO7: Discuss about the enzyme-enzyme interaction. CO8: Write about the isoenzyme with special reference to lactate dehydrogenase. CO9: Discuss the different types of immobilization techniques. CO10: Discuss the different methods for analysis for secondary and tertiary structure of enzymes.
C8- Molecular Biology	CO1: Learn structure of nucleic acids (DNA and RNA) and genome organization in prokaryotes and eukaryotes. CO2: Understanding the concept of Gene at molecular level. CO3: Overview of the central dogma of life and various molecular events CO4: Learning molecular events in the DNA replication and role of different enzymes and DNA repair mechanism. CO5: Discuss molecular events of Transcription and post- transcriptional processing of primary transcripts, RNA editing. CO6: Describe molecular Events of Translation leading to protein synthesis and Post translational modification. CO7: Understanding the regulation of gene expression in prokaryotes using operon concept.
C9- Immunology	CO1: Mention the important functions of complement system. What is innate and acquired immunity? Illustrate with suitable examples.

	CO2: Explain with suitable examples. CO3: Describes the basic molecular structure of MHC I and MHC II. CO4: What is antibody diversity? How diversity are maintain within human body. CO5: Give the detail description of cells involves in immunity. What are autoimmune diseases? CO6: Describe few important autoimmune diseases with causative mechanism.
C10- Chemistry-2 (Organic and Inorganic Chemistry)	CO1: Describe electrophilic substitution reaction. Give the general pattern of mechanism of E+ substitution reaction. CO2: Discuss with the mechanism of the followings, i) Friedel Crafts Alkylation and Acylation Reaction. ii) Williamson Reaction iii) Reimer Tieman Reaction iv) Fries Rearrangement and Claisen Rearrangement reaction v) Coupling and Hofmann Bromide Reaction CO 3. What is carbonyl compound? How do you prepare it, give at least three method? C0 4. Discuss the chemical properties of carbonyl compound specially i) Aldol Condensation reaction ii) Cannizzaro reaction iii) Esterification reaction CO 5. Discuss three important methods for the preparation of Alkane, Discuss the important chemical reaction of alkane, How will you prepare Grignard Reagent? CO6: Discuss the important reactions of Grignard Reagent, the Nucleophilic Addition, Aromatic electrophilic substitution reaction with examples. CO7: Discuss SN1 , SN 2 , E1 and E2 reactions with example. CO 8. Describe Periodic Table. Especially atomic radius, Ionization Potential energy, electron affinity and electronegativity, different type of chemical bonds, with examples. CO9: Write notes on i) Valence Bond Theory ii) Fajan's Rule iii) Dipole moment
SEC2- Molecular Diagnostics	CO1: Enzymes available for enzyme immunoassay and their conjugation. CO2: Method for production of monoclonal and polyclonal antibodies and their use in immunoassay CO3: Write the application of PCR, RFLP, SNP in clinical microbiology CO4: Describe the microdilution and disc diffusion bacterial susceptibility test. CO5: Write the concept and methods of idiotypes, epitope designing. CO6: Describe the different types of immunodiagnostic test. CO7: Discuss the various techniques such as immunofluorescence, radioimmunoassay CO8: Discuss about GLC, HPLC, Flowcytometry and cell sorting.

	CO9: Write about transgenic animals.
C11- Bioprocess Technology	CO1: Describes few important advantages and disadvantages of batch, continuous and fed-batch culture. CO2: Write the different factors which affects K_La value. What is Monod growth kinetics? Describes the factors which affecting bacterial growth kinetics. CO3: Write the different components involve in agitation and aeration process within ideal bioreactor. CO4: Briefly describes the different types of bioreactors used in industries. CO5: How the bioethanol is produce in large amount by using recombinant microbes. Illustrate with suitable flow chat. CO6: What is Single cell protein? How SCP is produce from waste raw- materials.
C12- Recombinant DNA Technology	CO1: The student will be able to describe the various tools and techniques applied in RDT. CO2: The student will be able to associate the methods of RDT with their exact purpose/role in genetic engineering. CO3: The student will be able to relate applications of RDT with science of plant and animal biotechnology. CO4: The student will be able to design genetic engineering strategies using concepts of RDT. CO5: The student will be able to justify why particular method of RDT has been applied in each research experiment/project. CO6: The students will be able to clone the gene which they can use in the field of medical, agriculture and industries.
DSE1- Dissertation	The students undergo 1-2 months project work at any industry or research institute or hospital or university or training institute. Dissertation topic is decided by the student and concerned institute to which he/she is attached. The students get exposed to and learn different modern industrial and research techniques and fulfill the upcoming requirements in this field. CO1: Students learn different modern industrial and research techniques. CO2: To explore the relationship between the knowledge & skills acquired in college with those required in the working situations. CO3: Exposure to a real-life work place environment. CO4: To establish an interest in research/industrial/commercial activities. CO5: To acquire new relevant skills to match upcoming requirements in the field.
DSE2- Biostatistics	CO1: What are the different types of data and their method of collection. CO2: What are the measures of central tendency and dispersion. CO3: Discuss the peakedness of graph through skewness and kurtorsis. CO4: Understand the classical and axiomatic probability and their theorems.

	CO5: Discuss the methods of sampling. CO6: To understand the problems on test of significance, T-test, chi-square test, ANOVA. CO7: To understand the problems related to correlation and regression through the biological examples.
C13- Bio Analytical Tools	CO1: What is beer-lambert law? Give the detail descriptive of working principle of spectrophotometer. CO2: How the nanotechnology are useful in biological science. CO3: What is electrophoresis? How the proteins are separated by using SDS-PAGE. CO4: What is chromatography? Describe the basic principle of different types of chromatography. CO5: Give the basic facts behind electron microscope. Describe with suitable diagram the basic working principle of SEM and TEM. CO6: What is isoelectric focusing? How proteins are separated by this method. Describe in details the working principle of Pulse field electrophoresis. CO7: Describe with working principle about different types of centrifuge used in laboratory.
C14- Genomics and Proteomics	CO1: The student will be learning the techniques involved in organizing and sequencing genomes. CO2: The student will be able to screen the gene sequence using various molecular markers. CO3: Students will be able to understand the concept and functioning of genomes, transcriptome, and proteomes. CO4: Students will be able to classify the complexity of genome/ proteome structural and functional organization. CO5: Students will be able to formulate and assess experimental design for solving theoretical and experimental problems in Genomics and Proteomics fields. CO6: Students can implement their concept in the field of medicine and quality improvement criteria.
DSE3- Bioinformatics	CO1: To get introduced to the basic concepts of Bioinformatics and its significance in biological data analysis. CO2: Describe the history, scope and importance of Bioinformatics and role of internet in Bioinformatics. CO3: Understand different types of Biological Databases. CO4: Overview about database search tools. CO5: Introduction to the basics of sequence alignment and analysis. CO6: Describe about the various techniques, algorithms and tools used for Phylogenetic Analysis
DSE4- Plant Biotechnology	CO1: Define the cytogenic and organogenic differentiation. CO2: State the different types of culture method. CO3: Understand mechanism of In- vitro haploid production CO4: Write the different techniques for diplodization and chromosome elimination.

	CO5: Know method of protoplst isolation and their fusion. CO6: Mechanism of formation of cybrids. CO7: Describe different types of somaclonal variation. CO8: Learn methods for biocontrol of pathogen.
GE1-Developmental Biology	CO1: Describe perspective of development Biology, Gametogenesis (Spermatogenesis, Oogenesis), Fertilization and different types of eggs on the basis of yolk. CO2: Define the types, patterns & mechanism Blastulation and Gastrulation. CO3: Understand formation & differentiation of primary germ layers, Fate Maps in early embryos. CO4: Discuss differentiation of Cell, control of differentiation at the level of genome, transcription and post-translation level. CO5: Develop the Concept of Primary, secondary & tertiary embryonic induction, Neural induction and induction of vertebrate lens. CO6: Discuss development of vertebrate eye and fate of different primary germlayers. CO7: Describe development of behaviour: constancy & plasticity, Extra embryonic membranes, placenta in Mammals.
GE2-Bioetihcs&Biosafety	CO1: Understand Indian Patent Law, World Trade Organization and its related intellectual property provisions. CO2: Explain Intellectual/Industrial property and its legal protection in research, design and development, patenting in biotechnology, economic, ethical and depository considerations. CO3: Discuss selection of a product, line, design and development processes, economics on material and energy requirement, stock the product and release the same for making. CO4: Define the basic regulations of excise, export potential etc. CO5:Analyse necessity of Bioethics, different paradigms of Bioethics – National & International and Ethical issues against the molecular technologies. CO6:Understand biosafety and health hazards, the concept of containment level and Good Laboratory Practices (GLP) and Good Manufacturing Practices (GMP).
GE3 -Biotechnology and Human Welfare	CO1: Describe the concept of protein engineering, enzyme and polysaccharide synthesis, activity and secretion and antibiotic production. CO2: Understand the significance of N2 fixation, transfer of pest resistance genes to plants, interaction between plants and microbes and qualitative improvement of livestock. CO3: Discuss chlorinated and non-chlorinated organ pollutant degradation; degradation of hydrocarbons and agricultural wastes, stress management, development of biodegradable polymers. CO4: UnderstandForensic science e.g. solving violent crimes such as murder and rape; solving claims of paternity and theft etc. using various methods of DNA finger printing. CO5: Describe development and production of non-toxic therapeutic

	agents, recombinant live vaccines, gene therapy, diagnostics.
GE4 - Entrepreneurship Development	CO1: UnderstandNeeds and Importance of Entrepreneurship, Promotion of entrepreneurship, Factors influencing entrepreneurship, Features of a successful Entrepreneurship. CO2: Describe forms of Business Organization, Project Identification, Selection of the product, Project formulation and Assessment of project feasibility. CO3: DefineImportance of finance / loans and repayments, Characteristics of Business finance, Fixed capital management, working capital its sources and how to move for loans. CO4: Learn about inventory direct and indirect raw materials and its management. CO5: Do an analysis on marketing-mix, product management, marketing Research and survey and stock management. CO6: Understand International business, Selection of a product, Selection of a market for international business, Export financing, Institutional support for exports.

English Language and Literature (ELL)

Programme Objective:

The most important objective of the programme B.A. Vocational Hons is to equip the students with employability skills, open various fields of opportunities for them and prepare them to fit in the job market by imparting a solid foundation of the subject or area of study. The various courses under this programme are designed to enhance the critical thinking and analytical skills, develop creative concepts, explore various opportunities in the concerned field and inculcate entrepreneurship ideas. It prepares them not only for taking up jobs after their studies but also facilitate them to pursue higher education with an extra edge. The whole programme has been planned keeping in mind the requirements and openings in the professional world and grooming the students for the same.

Programme Specific Objective:

The most important objective of the programme B.A. Hons in English Language and Literature (ELL) is to prepare the students for higher studies and jobs by imparting a solid foundation of the subject English along with other necessary skills to enhance their employability proficiency. It not only facilitates them to overcome the barriers of learning but also provides an opportunity to master the various aspects of language. The programme specific objective of the course is to prepare the students for various competitive exams and interviews as far as English is concerned. In addition to this it broadens the horizon of thinking of students and prepares them for life ahead as various issues of the contemporary world are addressed through various texts.

Course Objective:

Core Papers

CO1: To revise the fundamentals of English grammar and ensure the application of the correct rules of grammar in language usage. The short stories exemplify the use of language in the most effective way.

CO2: To provide a background to the study of history of English literature focusing on the history of poetry and introducing the students to the basic literary terms

CO3: Trace the origin of English as a language , to promote understanding of the various aspects of language and its variants

CO4: To provide a comprehensive history of English Drama along with two classics from different ages and inculcate basic understanding of the various aspects of drama such as plotting, characterization and themes.

CO5: To introduce the students to an integral part of language study focusing on human speech mechanism, basic sounds of the English language and its various usage

CO6: To provide a background to the study and development of the English novel, tracing the formation of different novel forms and teach two popular novels by distinguished novelists

CO7: To familiarize the students with the Indian writing in English through poetry and fiction

CO8: To introduce the history of English prose through different ages and acquaint the students with major essayists and their works

CO9: To familiarize the students with the concept, structure and functioning of mass communication along with the details of journalistic writings

CO10: To provide a basic understanding of the development of English literary criticism and terms associated with it ensuring some influential ideas pertaining to literary creation and understanding

CO11: To familiarize the students with two literary ideologies through two different genres of fiction

CO12: To familiarize the students with the pattern of English in various competitive exams focusing on vocabulary and various other aspects of language use

CO13: To offer a comprehensive account of the theoretical approaches applied to literature through the study of major literary theories

CO14: To introduce the students to a recent area of specialization in language study focusing on the various methods and skills of the teaching-learning process

Discipline Specific

CO1: To promote the study of women's writing in English enabling them to understand their line of thought and perspective on various issues

CO2: To introduce them to literary classics from different parts of the world

CO3: To familiarize the students with the issues faced by people of the third world countries

CO4: To acquaint the students with various issues of contemporary Indian society addressed and presented in the form of drama

Generic Elective

CO1: Detailed study and focus on writing skills through practice

CO2: To familiarize the students with various forms of journalistic writings such as news story writing and feature writing along with providing them a fair concept of journalism and its functioning

Skill Enhancement Course

CO1: To acquaint the students with the concept, strategies and types of translation and make them practice

CO2: To encourage and give an opportunity to students to make a power point presentation, participate in group discussions and upgrade their body language, team etiquettes and interview skills

Ability Enhancement Compulsory Course

CO1: To introduce the basic theory and aspects of English communication to students focussing on the functional side of language usage through descriptive writing, business letters, covering letter and resume writing.

Programme Outcomes - PG

The Postgraduate programme is spread over four semesters and offers sixteen courses.

Arts/ Science/ Commerce(Self-financed)

The Postgraduate programme is aimed at providing students an in-depth studyofnew developments in the respective disciplines with a strong theoretical and quantitative focus aimed at enhancing critical thinking and fostering analytical abilities through readings invarious critical theories.The objective is to:

- *Promote knowledge based learning*
- *To develop global competencies in their respective domains*
- *Ensure rigorous treatment of fundamental concepts related to each discipline*
- *Introduce theories specific to different fields of learning*
- *Prepare the students for competitive examinations like UGC-NET/ UGC-CSIRNET, DST, ICMR,DRDO etc*
- *Enable students to take up research in their chosen field*
- *To create highly competent human resources which can carry forward the responsibility if imparting knowledge in the field of higher education*
- *Lay a strong foundation for all future academic endeavours*

MASTER OF COMMERCE

Programme Objectives

1. To create highly diligent , committed and conscious postgraduate who are ready to set themselves free from socio-economic religious caste and gender prejudices and contribute positively towards socio-economic development of the neighborhood, locality, region and nation.
2. To provide high quality education to those who pursue a professional career and to enrich ones who are desirous of imparting education uptopost graduationlevel .

Programme Specific Objectives

1. To provide quality higher level commerce education that would enhance competencies for employment, entrepreneurship and research.
2. To impart advance knowledge in the divers function of commerce and management.

Course Objectives

SEMESTER 1

MC.1 ORGANISATIONAL THEORY AND BEHAEVIOUR

The objective is to develop a theoretical understanding among students about the structure and behavior of organization as it develops over time. The course will also make them capable of realizing their competitiveness of firms.

MC.2 MANAGERIAL ECONOMICS

The objective is to integrate the concept of economics with the tools management in order to analyze the decisions and plan to formulate optimal business decisions.

MC.3 MANAGERIAL ACCOUNTING

The objective is to utilized the data so formed from accounting process in management field to take wise decisions in favor of the organization.

MC.4 STATISTICAL ANALYSIS

The objective is to orient the learner to use the statistical tools in analyzing the functioning and the progress of the firm.

SEMESTER 2

MC.5 ENTREPERNEURSHIP DEVELOPMENT

The purpose of the paper is to orient the learner towards entrepreneurship as a career option and enhance creative thinking skills and behavior for effectiveness at work.

MC.6 BUSINESS ENVIRONMENT

When we study Business Environment, we somehow go through the entire environment that affects the functioning of business and some of them are out of the control of the management. So by understanding the factors affecting Business Environment, the learners and the management team can divert the affection caused in the favor of the firm.

MC.7 FINANCIAL MANAGEMENT AND POLICY

The objective is to familiarize the students with the principles and practices of financial management.

MC.8 MARKETING MANAGEMENT

The objective is to correlate the marketing elements with the management stuffs to better understand the dynamic market where the organization survives, functions and explore or degrade.

SEMESTER 3

MC.9 STRATEGIC MANAGEMENT

The objective is to learn the strategic formulation and its implementation in the organization with a view to serve the organization's interest.

MC.10 INTERNATIONAL BUSINESS AND TRADE

The objective of the course is to expose students to the concept, importance and dynamics of international business and India's involvement with global business operations. The course also discuss on the theoretical foundations of international business to the extent these are relevant to understand the mechanics of global business operations and development.

MC.11 QUANTITATIVE TECHNIQUES FOR BUSINESS DECISION

This course presents the various mathematical models, networking, probability, inventory models and simulations for managerial decisions. Thus, its objective is to enable the students to learn techniques of operations research and resources management and their application in decision making in the management.

MC.12 PAPER 1 OF GROUP A (FINANCE)

FINANCIAL MARKETS AND INSTITUTIONS

The objectives of the course are to prepare students with a good understanding of the theoretical foundation of financial market and institutions, and to keep students updated on the latest discourse on practical issues and policies of the contemporary financial markets of India with an overview of the global financial markets and institutions.

MC.12 PAPER 1 OF GROUP B (HUMAN RESOURCE)

HUMAN RESOURCE DEVELOPMENT

HRD helps the learner to learn and understand the integrated use of training, organizational and career development efforts to improve individual, group, and organizational effectiveness.

SEMESTER 4

MC.13HUMAN RESOURCE MANAGEMENT

To familiarize the student with the human resource management involving planning, placement and training, significance of performance appraisal, methods of compensation etc.

MC.14 CORPORATE GOVERNANCE, ETHICS AND SOCIAL RESPONSIBILTY

The objective of this paper is to determine the characteristics of the corporate governance structure, corporate dimension, geographical location and financial structure that might influence the dissemination of both codes of ethical conduct and politics of corporate social responsibility.

MC. A 15 GROUP A (FINANCE)

PAPER 2 - SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT

It *aims* at providing an in-depth knowledge of the theory and practice of *portfoliomanagement.* Important theories, techniques, regulations and certain advancements in theory of *investment* will be covered with an *aim* of helping the participants make sound *investment* decisions in the context of *portfolio investment*.

MC. B 15 GROUP B (HUMAN RESOURCE)

PAPER 2 - MANAGEMENT OF INDUSTRIAL RELATIONS

The *objective*is to help the learner to learn and understand the key elements and other required stuffs to maintain and develop good and healthy *relations*between employees and employers or operatives and *management*.

MC.16 RESEARCH METHODOLOGY AND PROJECT WORK

It aims at providing the general understanding of business research and the methods of business research. The course will impart learning about how to collect, analyze, present and interpret data

DEPARTMENT OF ENGLISH

Postgraduate Programme in English under Choice Based Credit System.

Programme Specific Outcome: The Postgraduate programme in English is spread over four semesters and offers sixteen courses.Core Courses 1 to 7 deal exclusively with a detailed study of British literature. These courses aim at the study, interpretation, appreciation and critiquing of literary texts. It is hoped that students will be able to enhance their literary sensibilities through the readings of various works of literature in different genres. The programme offers four elective courses to students so that they can choose their courses according to their interests. Core Course 8 offers two elective courses and Core Course 12 likewise offers two elective courses. Core Courses 9,10, 11 and 13,14,15 offer further study and interpretation of literature, a study of classical criticism and contemporary literary theory; new literatures in English and contemporary issues such as gender and literature. Further, there is a course that initiates students to an understanding of the theoretical foundations of Postcolonial literary theory. The Postgraduate programme in English is aimed at:

- providing students an in-depth study of literature in English. Students are offered the study of a selected number of the most representative literary texts from various literatures, namely, British, Indian, American, European and Indian literatures in translation; literature dealing with gender studies; new literatures with postcolonial concerns.
- enhancing critical thinking and fostering analytical abilities through readings in critical theories.
- enabling students to take up research and equipping them with basic knowledge for their progression into higher education and/or greater employability.

Course Outcomes:

Core Course1: This course dealing with the prose and poetry of the 14^{th} to the 17^{th} centuries exposes students to the writings of canonical authors belonging to the early periods in the history, growth and development of British literature. The purpose of the course is to enable students to read, understand , interpret and critique literary texts.

Core Course 2: Core Course 2 is devoted to the study of drama. Selected works by canonical authors are offered for a detailed study and analysis. The course aims at providing the students an understanding of the genre.

Core Course 3: The study of the poetry and drama of the Neo-classical age are meant to impart to the students a knowledge of the literary characteristics of the age as manifested in the two genres and also to provide the students an understanding of the works of the authors prescribed.

Core Course 4: The course is devoted to the study and analysis of prose and prose fiction of the Classical period in English literature. It is hoped that students will be better able to understand, interpret and appreciate the literature in the genre.

Core Course 5: The course affords the study, analysis and appreciation of the poetry and fiction of the 19^{th} and early 20^{th} centuries. Selected works by canonical authors have been made available to students for the study.

Core Course 6: The literature in English of the Modern period is aimed at imparting to the students a study and interpretation of modernist trends and literary concerns.

Core Course 7: This course is devoted to the study of Modern fiction. The study and analysis of canonical authors in the genre afford a better understanding of the genre.

Core Course 8a & 8b: These are elective courses. Students are offered a choice of two courses and they are free to choose either of the two courses depending on their areas of interest.

Core Course 8a: This is an elective course devoted to the study of American literature. Literary works ranging from poetry, fiction and drama are offered to the students for literary appreciation and to gain knowledge of the social and literary concerns in American literature.

Core Course 8b: This elective course introduces students to another new field of study and research, namely English Language Teaching. The course aims at sensitizing students to the importance of language education and the various issues relevant to the domain of language teaching, language learning and research in language teaching and learning.

Core Course 9: The course offers a study of Classical criticism and theory as well as aspects of Indian aesthetics. Students gain an understanding of the rubrics of literary theory and criticism.

Core Course 10: Students are exposed to the writings in English by Indian authors in the three genres, namely, poetry, drama and fiction.

Core Course 11: This course offers students a study of contemporary literary theory. The most celebrated essays by the prominent literary theorists are offered for study, analysis and interpretation with the objective of fostering the critical abilities in the students.

Core Courses 12a& 12b: These elective courses offer the students the freedom to choose either of the two courses.

Core Course 12a: This course introduces students to the study of European literature in translation. The prominent European authors and some of their celebrated works are made available to students through the translations of their works. The students gain an opportunity to read, study and appreciate some of the best literature besides British literature.

Core Course 12b: This course provides students a deeper study and foster literary appreciation of the works of Indian authors. Students desirous of improving their knowledge of Indian literature get an opportunity to learn more about it.

Core Course 13: The course introduces students to the best in literature that has been produced in the rest of the world. Students get an opportunity to enhance their knowledge of world literature and familiarize themselves with some of the most celebrated works of prominent writers dealing with postcolonial concerns.

Core Course 14: The students are introduced to another important area of study in literature, namely, gender studies. A few important writers and their works are offered for study and literary appreciation.

Core Course 15: The course introduces students to the major theoretical concerns of Postcolonial literary theory. The objective of the course is to impart to the students a better understanding of the theoretical underpinnings of Postcolonial literary works so as to enable students to understand them better.

Core Course 16: this course is aimed at fostering the research abilities in students in order to carry out actual research. The course is oriented to impart to the students the basic knowledge and skills in carrying out research. It aims to groom students for higher education and research.

Department of Geography (PG)

GEO/PG/TH/CC 101
It being a course at the interface of Geography with earth, the student has to be sensitized to background knowledge of Geography and environmental sciences.The objectives of the course is to familiarize the students with the need for understanding of Geomorphology with reference to certain fundamental concepts, focusing on the unit of geomorphology in the earth materials and the processes with or without an element of time. Process component of Geomorphology is segmented into the internal and external processes of landscape evolution.Finally a few selected applications of Geomorphology to societal requirements and quality of environment are dealt with.

GEO/PG/TH/CC 102

The objective of this paper is to provide an overview of resource geography and its interface with environment. The course aims to provide an understanding of the existing reality of resource utilization and depletion, further aims to sensitize the students to the concept of sustainable resource use.

GEO/PG/TH/CC 103

To familiarise the students with the basics and fundamentals of Remote Sensing.To introduce GIS (Geographic Information System) as a tool of spatial science. To indicate the basic elements of GIS and methodology of GIS.To outline the steps and areas of application of GIS.

GEO/PG/PR/CC 104

To introduce some basic statistical procedures to the students to be applied to various themes in geography. To indicate the assumptions, limitations & interpretation of these procedures & results. To train the students to handle these statistics towards analyzing the geographical problems.

GEO/PG/TH/CC 201

The aim of the course is to provide an understanding of weather phenomena. Dynamics of global climate and generation of climatic information and their application.

GEO/PG/TH/CC 202

The aim of the course is to introduce the students to soil which is one of the important element of the earth which supports the life system. The overuse and misuse of soil in recent years have resulted in degradation of soil. Study of soil will help the students to appreciate the inherent limitations of soil to a particular use and managing the soil effectiveness
The basic objectives of this course are to appraise the students with the interrelationship between man, the environment within which he lives and his linkages with other organisms. Such linkages form ecosystem, which varies in different biomes. The importance of conserving biodiversity to maintain ecological balance has also been emphasized in the course.

GEO/PG/TH/CC 203

To introduce the students to the philosophical and methodological foundations of the subject and its place in the world of knowledge.To familiarize them with the major land marks in development of Geographic thought at different hours of time.

GEO/PG/PR/CC 204

To introduce GIS (Geographic Information System) as a tool of spatial science
To indicate the basic elements of GIS and methodology of GIS.To outline the steps and areas of application of GIS.Tofamiliarise the students with the basics and fundamentals of Remote Sensing.

GEO/PG/TH/CC 301

The economy of the world is changing in recent times. The changes in primary, secondary and tertiary stage is dynamic in nature. In view of this, the objectives of this course are to integrate the various factors of economic development to acquaint the students about dynamic aspects of economic geography.

GEO/PG/TH/CC 302

The present syllabus of this paper includes study of various aspects of environment and problems in the context of present situation. In the process of Globalization, the changing nature will make aware of the students about the new dimensions of global environmental issues with reference to India.

GEO/PG/TH/CC 303

The course is meant to provide an understanding dimensions of agriculture and the emerging issues. The course is further aimed at familiarizing the students with global and regional level problems and also equip them for comprehending the Indian situation.

GEO/PG/PR/CC 304

The objectives of this course are to train the students in the art of socio cartographic techniques and appropriate software for designing and mapping.

GEO/PG/TH/CC 401

The objectives of the course is to familiarize the students with the need for understanding of various dimensions of political geography with reference to certain fundamental concepts.

GEO/PG/TH/CC 402

The present syllabus of this paper includes study of various aspects of environment and problems in the context of present situation. In the process of Globalization, the changing nature will make aware of the students about the new dimensions of global environmental issues with reference to India.

GEO/PG/TH/CC 403

The objectives of this course is to make the students understand the process of urbanization and origin, growth and classification of urban settlements with relevant theories and models. Examine the contemporary urban issues and suggest new urban planning and urban policy perspectives.

GEO/PG/PR/CC 404

Fieldwork is useful to provide the students with the understanding of ground reality by observation and with the help of a specially prepared questionnaire.

M.A. Economics:

The Master of Arts (M. A.) programme in Economics reflects new developments in the Economics discipline.

1. The curriculum has a strong theoretical and quantitative focus with all students being trained in the use of computers and statistical software that they find useful in their professional careers in academia, research institutions, government, and industry.

2. The programme is semester-based and includes a large number of elective courses which allow students to pursue their varied interests and to specialise in their fields of choice.

3. Entry into the programme requires superior analytical, mathematical, and quantitative skills. The ability to write coherently and analytically in English is very important.

4. The programme will further hone these skills in the context of the Economics paradigm.
5. The student should be able to bring to bear these skills to the modeling and analysis of a wide range of theoretical and applied problems in Economics and to the understanding and solution of real world economic and social problems.

M.A. Economics Course Outcome

Courses	**Outcome**
SEM 1	
ECOFC1	To expose the students to the advanced principles of microeconomic theory.
ECOCC1	To expose the students to the advanced principles of macroeconomic theory.
ECOCC2	It aims at understanding the role of the government in promoting the efficiency objective in the presence of several sources of market failures and to study the taxation, expenditure and debt policies of the government.
ECOCC3	This course is designed to introduce mathematical economics to the students and to show the application of various tools of linear algebra and differential calculus to analyse the economic models used in microeconomics and macroeconomics.
SEM 2	

ECOCC4	This course is designed to gain insight into the dimensions of welfare economics including recent developments in the area.
ECOCC5	This course is designed to develop a thorough understanding of macroeconomic theory and have a critical knowledge of recent research in some key areas of macroeconomics.
ECOCC6	The course presents an overview of how macroeconomic factors influence market pricing in debt, equity and foreign exchange markets.
ECOSEC1	This course is designed to cover the basic procedures of statistics and econometrics.
SEM 3	
ECOCC7	This course is designed to expose the students to the basic principles of economic growth and economic development.
ECOCC8	This course is designed to expose the students to the advanced tools of international trade.
ECODSE1A	This course is aimed at developing the mathematical framework for understanding of the theories of microeconomics relating to consumer behaviour and production.
ECODSE1B	This course is designed to expose the students to understand the role of agriculture in economic development and analyse various dimensions of the agricultural sector.
ECODSE2A	This course is designed to cover the foundations of econometrics and emphasizes on learning of OLS estimators as well as the problems faced due to OLS assumptions.
ECODSE2B	This course is designed to expose the students to understand the role of agriculture in economic development and analyse various dimensions of the agricultural sector.
SEM 4	
ECOCC9	This course is designed to expose the students to the basic principles of economic growth and economic development.
ECODSE3A	This course is aimed at developing the mathematical framework for understanding of the theories of macroeconomics relating to national income determination, growth and fluctuations.
ECODSE3B	This course is designed to expose the students to understand various dimensions of rural labour market and their inter linkages.
ECODSE4A	This course is designed to cover the time series analysis. The second part of the course covers an in-depth analysis of multivariate distribution.

ECODSE4 B	This course is designed to expose the students to analyse the demographic data base in India and understand the government policy to control the population.
ECOSEC2	This course is designed to expose the students to understand the role of agriculture in economic development and analyse various dimensions of the agricultural sector.

DEPARTMENT OF HINDI

The Department of Hindi of St. Xavier's College, Ranchi was established in the year 1944. When it started, the department offered Intermediate (Principal Hindi & R.B. Hindi) and Graduation (Principal Hindi and Hindi Honours) courses. The Department began its M.A. Programme in the year 2005. It has five regular faculty members, all of them holding doctoral and two of them holding post-doctoral degrees. All of them are involved in research work. Two of the senior most faculty members completed their Minor Research Projects and Major Research Projects. The senior faculty members are involved in supervising PhD research scholars, impart training in workshops and other programmesorganised by various government and social organisations. They also have several books to their credit. Since its inception, the department has been recording outstanding result. Besides focussing on the academic growth of students, the department also strives to work for an overall development. The department encourages active participation in literary, social and cultural events at regular intervals. It holds seminars, and arranges an educational tour every year.

Hindi is one of the most widely spoken languages not only in the country but also in the world. Because of its flexibility, it is ever growing, ever flourishing. Not only this, its applications in different walks of life are also many. The programme reflects the growth, changes and the current trends in Hindi language and literature. It takes into consideration the changing social norms, patterns of communication, the role of language in the present scenario and the changing social values of our times. Since language carries culture, Hindi too should be perceived not just as a language but also as a carrier of art, culture, musicand literature. The programme also aims

at developing an understanding of the culture of the places where Hindi is used. The course has been designed such that the students are able to look back at the origins of the language and the culture it represents and at the same time learn to use the language in the context of the contemporary society to fulfil their needs in the present times.

VISION

- To develop critical thinking among students.
- To enable a holistic understanding of language, literature and culture in general and that of the Hindi language and literature in particular.
- To develop among the students a positive outlook and a sense of pride for Hindi.
- To develop Language Proficiency and Communication Skills among students.
- To instil the sense of responsibility among students.
- To inculcate the feeling of patriotism and admiration for the country among students.
- To help students establish a harmonised connection between the traditional and modern ideas of language in general and the Hindi language in particular.
- To enable students to realize the relation between the evolution of thought and culture and the evolution of language.
- To form optimistic, sensitive and mature human beings who can responsible to socio-political causes and calls.

MISSION

- To impart a comprehensive knowledge of Hindi language and literature.
- To acquaint the students with the relevance of Hindi in building careers.
- To enable students to take up Hindi for appearing for the civil service examinations.
- To familiarise the students with the use of Hindi in translation and interpretation.
- To develop a journalistic attitude.
- To enable students to use Hindi as a tool to develop communication skills and other soft skills.
- To make students understand the importance of Hindi in the field of advertisement and marketing.

- To hone the skills of creative writing and writing for media.
- To develop stage skills for programme-hosting and voice over.
- To inculcate leadership qualities among students.
- Personality development.
- To encourage team spirit, mutual cooperation and the ability to improve public relations.
- To enable students to communicate effectively in Hindi as well as local languages and remain connected with people by using modern ways and means like social media.

JOB PROSPECTS

- Teaching – School, College, University
- Administrative Services – Centre and State
- Journalism and Mass Communication
- Editing and Review
- Hindi Officer in Public and Private Sectors
- Translator
- Interpreter
- Anchor, Announcer and Programme Host
- Public Relations Officer
- In the field of Creative Writing and Advertisement

UPCOMING COURSES

Certificate/ Diploma/ Add-on Courses in:

- Official Language
- Theatre
- Translation
- Advertisement

COURSE INPUT

ABOUT M.A. HINDI COURSE AT SXC, RANCHI

Eligibility for Admission : Graduate with Honours in Hindi from any college/university with at least 50% marks at Graduation level.

No. of Seats : 50

Admission : on the basis of Entrance Test and Interview

Duration : 2 years (4 semesters)

Reservation : As per Govt. rules

M.A. Hindi Course Objectives
Semester I

Paper	**Objectives**
CC1 (PraacheenKaavya)	To acquaint the students with ancient Indian poetry and thereby introduce them to the philosophies that make up the Indian thought and socio-cultural-religious ethos. The student should also be able to assess the relevance of ancient poets in the modern times.
CC2 (AadhunikKaavya)	To enable the student to trace the evolution of the matter and manner of Hindi poetry. The student should be able to analyse the linguistic and stylistic changes Hindi poetry has undergone over the years along with studying the change in perspectives reflected in modern and contemporary poetry.
CC3 (Hindi Katha Saahitya)	To enable the student to indulge in an in-depth study of the 'katha' or 'story' as a literary genre and thereby reflect upon the differences between the story and other literary genres, along with identifying the specialties of this genre over the others. The student should be able to critically appreciate the stories and analyse the portrayal of the world presented in them.

CC4 (Hindi Naatakaur Anya Vidhaayen)	This paper aims at exposing the students to various other literary genres – the drama and the literary essay. The student should be able to identify, analyse and appreciate the nitty-gritties of these genres. This paper also includes some critical essays that shall give the students better and deeper insights into literature and acquaint them with fresher perspectives towards analysing the subject and style of literary works.

Semester II

Paper	**Objectives**
CC5 (SaahityakaItihaas: AadikaalevamBhaktikaal)	This paper aims at leading the students to study in detail the two ages – Aadikaal and Bhaktikaal in the history of Hindi Literature and identify thereby the specific trends and practices in each era. It also enables the students to understand the methodology and the challenges involved in writing the history of Hindi literature.
CC6 (SaahityakaItihaas: ReetikaalevamAadhunikkaal)	To enable the student to engage in an in-depth study of two ages – Reetikaal and Aadhunikkaal and identify thereby the specific trends and practices in each era. The student should be able to have a holistic picture of the history of Hindi literature and be acquainted with the different genres that have emerged and evolved over the years.
CC7 (BharatiyaKavyashastra)	This paper aims at introducing the students to Indian poetics – its traditions, the various schools and the principles of each. The student will also engage in an in-depth study of the rasa and alankar theories in order to be able to appreciate literature using traditional Indian literary approaches.
CC8 (PaashchaatyaKavyashastra)	Exposing the students to western poetics, theories and criticism, this paper aims at enabling the students to acquire a holistic knowledge of the rules that govern literature across the world and the perspectives that are applied to literary and cultural analysis.

	The student should be able to apply their learning to the analysis of Hindi literature.

Semester III

Paper	**Objectives**
CC9 (BhashaVigyaankaSiddhaant)	Considering language as the basis of literature this paper aims at studying the basics of language and linguistics – their definition, nature, types, categorisations and the other aspects that form a language.
CC10 (Hindi Bhashaaur Jharkhand kiBhashaayen)	This paper focusses on the Hindi language, tracing its origins and evolution. The student shall also learn the various dialects and scripts associated with Hindi. Narrowing down the study to an in-depth understanding of the languages of Jharkhand, the paper aims at enabling the students to acquire knowledge about the various languages and dialects used locally in Jharkhand and thereby develop the ability to appreciate local and tribal literature.
CC11 (Prayojanmoolak Hindi)	The aim of this paper is to help students understand and appreciate the use of Hindi in various aspects of our daily life. This paper goes beyond the study of literature to enable an awareness of the functional aspects of the Hindi language as that used for interpersonal, professional, administrative and official communication.
CC12 (Prashaasanik Hindi)	This paper aims at allowing the students to engage in a detailed study of the use of Hindi for administrative purposes and thereby get acquainted with the various terminologies used in the administrative field. Translation is also a part of this course in order to let students have a practical experience with the use of administrative Hindi.

- **Semester IV**

Paper	Objectives
CC13 (AnuvaadVigyaan)	In line with our purpose of enabling an understanding of the use of Hindi for purposes beyond literature, this course focusses upon translation – its definition and nature, types, relevance and significance, the tools and techniques, and the methodologies and the challenges involved in translation.
CC14 (Shravya-DrishyaMaadhyam)	This paper aims at acquainting the students with audio-visual modes of literary and cultural expression. The student shall learn about the various aspects of communication through radio, television and advertisements.
CC15 (PatrakaaritaPrashikshan)	The objective of this paper is to make students aware of the basics of journalism – its nature, types and development. This paper too shows the expanse of Hindi as a language and the scope of its use beyond literary works.
CC16 (KoshVigyaan)	This course offers a study of the basics of dictionary – its definition, types, uses and how they are written. In the multilingual world we live in, all of us must be aware of the use of dictionaries. A knowledge of dictionaries shall help students use various types of dictionaries as tools for various purposes in different walks of academic and professional life.

MA Political Science

Students will:

- Develop their understanding of our political system and its basic political concepts.
- understand and interpret the political challenges faced and be able to provide solutions to contemporary challenges being faced.
- develop general understanding of political ideas concepts and theories both at national and international level.
- develop understanding on issues of international and domestic politics and public policy.
- demonstrate critical thinkingabout key issues of public policy and politics.
- demonstrate competency with basic tools underlying modern social science research including competency in statistics and qualitative analysis.

COURSE CODE	COURSE TITLE	COURSE OBJECTIVE
POLCC101	**WESTERN POLITICAL THEORY**	• To introduce students with the idea of political theory, its history, and approaches. • To focus on the nature and significance of political theory as it evolved and analyses its contemporary relevance. • To indicates the need to incorporate new perspectives that have arisen in the recent past. **Learning Outcome:** • Students will be able to develop understanding about the Nature and significance of political theory.
POLCC102	**COMPARATIVE GOVERNMENTS WITH SPECIAL REFERENCE TO CHINA, BRAZIL, JAPAN AND NIGERIA**	• To focus on examining politics in a historical framework while engaging with various themes of comparative analysis in developed and developing countries. • To understand the key features of major constitutions of the world. **Learning Outcome** • The students will be able to understand and apply different approaches to explain the functioning of different types of governing regimes. • They will be able to compare democratic regimes and evaluate their functioning. • They will be able to critically reflect on critical aspects of electoral democracy that includes functioning of parties and the relation between representation and democracy.
POLCC103	**STATE POLITICS IN INDIA**	• to understand the changing power structure of the centre-state relations within the quasi-federal framework of India strengthening state within the liberalization paradigm offers an interesting study. **Learning Outcome** • Student will be able to critically reflect on critical aspects of centre state relations. • They will be able to understand the nature Indian federalism and regional politics that includes functioning of parties and the relation between representation and democracy.

POLC C104	**INDIAN FOREIGN POLICY**	• To understand the internal and internal determinants of Indian foreign policy and its evolution since independence **Learning Outcome** • Students will be able to understand about the principles and determinants of India's Foreign policy and Post-cold war relations with various regions.
POLC C205	**HUMAN RIGHTS**	• To sensitize and inform the students about our human rights, its violations and redressal. **Learning Outcome** • The student will be able to explain the meaning of human rights and examine human rights issues in different social, political, and cultural contexts. • The students will be able to relate human rights with other rights of individuals. • They will come to know how ideologies which seek to create hegemony; religious or political, pose threats to the human rights of individuals.
POLC C206	**SOCIAL AND POLITICAL MOVEMENTS IN INDIA**	• To understand the nature of Political mobilization and different types of popular movements in India. **Learning Outcome** • This paper makes the student aware of the accommodative nature of Indian democracy. • This paper also provides knowledge of the changing nature of these movements with a focus on new social movements dealing with environmental and human rights issues.
POLC C207	**PUBLIC POLICY IN INDIA**	• to familiarize students with the broder theoretical, financial and practical contents in which public policies are discussed, justified, designed and sought to be implemented. **Learning Outcome** • Students can learn how policies are formulated and the various practical issues that are faced during its implementation.
POLC C208	**SOUTH ASIA IN**	• to present an analytical perspective on societal dynamics and their impact on political processes in South Asia.

	INTERNATIONAL POLITICS	• To study the institutions, processes, problems, and solutions than pertain to the South Asian region. **Learning Outcome** • This paper focuses on the political economy, social history of South Asia as a whole as well as on the variant forms of government –democratic and authoritarian- of its member nations.
POLC C309	**ADMINISTRATIVE THEORY**	• To focus on the theories that have shaped the emergence of modern systems of governance and their related structures and processes including western and non-western tradition. **Learning Outcome** • The coursed has a clear normative thrust to evolve pre requisites for promoting effective and just administration at the local and national levels.
POLC C310	**E-GOVERNANCE**	• to provide students insightful exposure in this emerging trend in governance so that they are able to appreciate the phenomenon and the process in an efficient way. **Learning Outcome** • Expansion of ICT is redefining relationships among various stakeholders in the process of governance. E-Governance is as emerging trend to re-invent governance, enhance good governance.
POLC C311	**POLITICAL PROCESS IN INDIA**	• to study the interaction between political processes and the constitutional structure in detail. **Learning Outcome** • student will be able to get an insight into different aspects of the political process in India, the basic nature and actual functioning of the system as a whole.

POLC C312	**GENDER POLITICS**	• to introduce the student to the various perspectives of the concept of gender. **Learning Outcome** • The students will be able to understand how the politics of gender is influencing the policy making process today.
POLC C413	**INDIAN ADMINISTRATION**	• to study public administration in its larger systematic milieu, i.e. in the Indian context. The nitty-gritty of Indian administration and its foundations and remedies to face the emerging challenges **Learning Outcome** • Students can learn how policies are formulated and the various practical issues that are faced during its implementation.
POLC C414	**DALIT POLITICS**	• to discuss the nature of Dalit politics, and the challenges and dilemmas that they face in contemporary India. **Learning Outcome** • Students will be able to understand the nature of dalit movement in contemporary India. • Students will be able to understand the factors affecting voting behaviour and Voting pattern in India.
POLC C415	**RESEARCH METHODOLOGY AND PROJECT**	• To introduce students with the processes and methods of empirical research for achieving scientific knowledge in political science. • to teach the method of data collection, sample survey, preparation of bibliography and questionnaire, writing of report, dissertation and thesis. **Learning Outcome** • students will be able to develop their research skills, critical analysis, synthesis and evaluation of new and complex ideas.
POLC C416	**POLITICAL PROCESS IN JHARKHAND**	• to make student aware of the Jharkhand movement related with the formation of the state. **Learning Outcome** • student will be able to understand the political process of the state in detail, identifying various dependent and independent variables and their working at the state as well as local level.

M.Sc. - MATHEMATICS

SEMESTER – I

TITLE OF THE PAPER	REAL ANALYSIS I
PAPER CODE	PGCCMAT 101
CREDITS	5

On successful completion of this paper students will learn to:

This course presents a rigorous treatment of fundamental concepts in analysis. To introduce students to the fundamentals of mathematical analysis and reading and writing mathematical proofs. The course objective is to understand the axiomatic foundation of the real number system, in particular the notion of completeness and some of its consequences; understand the concepts of limits, continuity, compactness, differentiability, and integrability, rigorously defined; Students should also have attained a basic level of competency in developing their own mathematical arguments and communicating them to others in writin

TITLE OF THE PAPER	LINEAR ALGEBRA
PAPER CODE	PGCCMAT 102
CREDITS	5

On successful completion of this paper students will learn to:

Recognize consistent and inconsistent systems of linear equations by the row echelon form of the augmented matrix, using rank. Find eigenvalues and corresponding eigenvectors for a square matrix. Compute with the characteristic polynomial, eigenvalues, eigenvectors, and eigenspaces, as well as the geometric and the algebraic multiplicities of an eigenvalue and apply the basic diagonalization result. Compute inner products and determine orthogonality on vector spaces, including Gram-Schmidt orthogonalization to obtain orthonormal basis.

TITLE OF THE PAPER	ORDINARY DIFFERENTIAL EQUATION
PAPER CODE	PGCCMAT 103
CREDITS	5

On successful completion of this paper students will learn to:

The Objective of this course is to introduce ordinary differential equations and fundamental theorems for existence and uniqueness. This course further explains the analytic techniques in computing the solutions of various ordinary differential equations appearing in various fields of science and technology.

TITLE OF THE PAPER	PYTHON PROGRAMMMING
PAPER CODE	PGCCMAT 104
CREDITS	5

The course is designed to provide Basic knowledge of Python to fulfill the following objectives:-

- Acquire programming skills in core Python with object-oriented concepts.
- To gain proficiency of Python in usage of suitable functions/packages to solve mathematical problems.
- To develop the ability to write file-based application programs in Python.
- To learn how to use exception handling in Python applications for error handling.

SEMESTER – II

TITLE OF THE PAPER	COMPLEX ANALYSIS
PAPER CODE	PGCCMAT 205
CREDITS	5

On the completion of the course, students will be able to:

This course is aimed to provide an introduction to the theories for functions of a complex variable. It begins with the exploration of the algebraic, geometric and topological structures of the complex number field. The concepts of analyticity, Cauchy-Riemann relations and harmonic functions are then introduced. Students will be equipped with the understanding of the fundamental concepts of complex variable theory. In particular, students will acquire the skill of contour integration to evaluate complicated real integrals via residue calculus.

TITLE OF THE PAPER	GROUP AND RING
PAPER CODE	PGCCMAT 206
CREDITS	5

On the completion of the course, students will be able to:

This course is designed to give students a foundation for all future mathematics courses. The fundamentals of algebraic problem-solving are explained. Students will explore: foundations of Algebraic structures, Groups, Rings, Ideals, Fields, Homomorphisms etc. The course also fulfills the objective to make students aware of the applicability of abstract mathematics in real world problems.

TITLE OF THE PAPER	TOPOLOGY
PAPER CODE	PGCCMAT 207
CREDITS	5

On the completion of the course, students will be able to:

The objective of the course on Topology is to provide the knowledge of Topological Spaces and their importance. To acquaint students with the concept of Homeomorphism and the topological properties and important mathematical concepts which can be generalized in topological spaces, so that students may learn and appreciate the nature of abstract Mathematics.

TITLE OF THE PAPER	PROBABILITY THEORY
PAPER CODE	PGCCMAT 208
CREDITS	5

On the completion of the course, students will be able to:

The aim of the course is to enable the students with understanding of various types of probability distributions and testing of hypothesis problems. It aims to equip the students with standard concepts of statistical techniques and their utilization. Apply the knowledge of statistical techniques in various experimental and industrial requirments.

SEMESTER – III

TITLE OF THE PAPER	REAL ANALYSIS II
PAPER CODE	PGCCMAT 309
CREDITS	5

On successful completion of this paper students will learn:

This course is designed to consider theoretical foundations of concepts of mathematical analysis, viz. derivative, MVTs, functions of several variables, measure theory and integration that have many important applications in different branches of pure and applied mathematics. Further, the objective is enable students familiar with these concepts and their fruitful applications. Understand measure theory and integration from theoretical point of view and apply its tools in different fields of applications. Extend their knowledge of Lebesgue theory of integration by selecting and applying its tools for further research in this and other related areas.

TITLE OF THE PAPER	PARTIAL DIFFERENTIAL EQUATION
PAPER CODE	PGCCMAT 310
CREDITS	5

On successful completion of this paper students will learn to:

This course deals with the mathematical theory of numerical methods especially finite difference and finite element methods used to solve partial differential equations (PDEs). In this course, students will study algorithms and methods to obtain numerical results for different kind of physically important PDEs system like Laplace, Poisson, Heat and Wave equations. Student will study analysis and applications of finite difference methods and finite element methods for the numerical solutions of various elliptic, hyperbolic and parabolic PDEs.

TITLE OF THE PAPER	FIELD THEORY
PAPER CODE	PGELMAT 301(A)
CREDITS	5

On successful completion of this paper students will learn to:

This course is designed to give students a foundation for advanced study in Algebra. The fundamental theorems of algebraic structures are explained. Field extensions, Einstein's irreducibility criterion, Galois extensions etc. Throughout the course, Advanced Core standards are taught and reinforced as the student learns how to apply the concepts in real-life situations. Create, select and apply appropriate algebraic structures such as Galois extensions, Automorphisms of groups and fixed fields, Fundamental theorem of Galois theory to understand and use the Fundamental theorem of Algebra. Identify the challenging problems in advanced Algebra to pursue further research.

TITLE OF THE PAPER	OPERATION RESEARCH I
PAPER CODE	PGELMAT 301(B)
CREDITS	5

On successful completion of this paper students will learn to:

This course is designed to provide a theoretical introduction and implementation of advanced optimization techniques in order to get best results from a set of several possible solutions of different problems viz. advanced linear programming problem, goal programming problem, game theory, dynamic programming and inventory models. The major focus of this course will be on formulation of real-world phenomena from its physical consideration and implementation of optimization techniques for solving these problems.

TITLE OF THE PAPER	MECHANICS AND FLUID MECHANICS
PAPER CODE	PGELMAT 302(A)
CREDITS	5

On successful completion of this paper students will learn to:

This course is intended to provide a treatment of advanced topics in fluid mechanics where the students will be able to apply the techniques used in deriving arrange of important results and in research problems. The objective is to provide the student with knowledge of the fluid mechanics and an appreciation of their application to real world problems. Understand the concept of rotational and irrotational flow, stream functions, velocity potential, sink, source, vortex etc. learn about the fundamental equations of the flow and energy.

TITLE OF THE PAPER	INTEGRAL TRANSFORMATION
PAPER CODE	PGELMAT 302(B)
CREDITS	5

On successful completion of this paper students will learn to:

This course is intended to prepare the student with mathematical tools and techniques that are required in advanced courses offered in the applied mathematics and engineering programs. The objective of this course is to enable students to apply transforms and variation problem technique for solving differential equations and extremum problems. Integral transforms are used to map one domain into another in which the problem is simpler to analyze. For example, the analysis of linear time-invariant systems usually becomes easier if the time domain representation is changed to the frequency domain representation using the Fourier transformation.

SEMESTER – IV

TITLE OF THE PAPER	FUNCTIONAL ANALYSIS
PAPER CODE	PGCCMAT 401
CREDITS	5

On the completion of the course, students will be able to:

The main aim of this course is to provide students basic concepts of functional analysis to facilitate the study of advanced mathematical structures arising in the natural sciences and the engineering sciences and to grasp the newest technical and mathematical literature. To teach the fundamentals of Banach Algebras and Spectral Operator Theory which are necessary for a deeper understanding of many adjacent mathematical fields (integral and differential equations, mathematical physics, harmonic analysis, operator theory etc.)

TITLE OF THE PAPER	CALCULUS OF VARIATION AND INTEGRAL EQUATION
PAPER CODE	PGELMAT 402(A)
CREDITS	6

On the completion of the course, students will be able to:

The objective of the course is to acquaint the students with the knowledge of mathematical techniques frequently applied in various branches of engineering and sciences. Also, one of the objectives of this course is to equip the students with the mathematical background required for the development of such techniques. Understand the theory and applications of integral transforms.
Explain how integral transforms can be used to solve a variety of differential equations
Understand the properties of various kinds of integral equations.

TITLE OF THE PAPER	DIFFERENTIAL GEOMETRY
PAPER CODE	PGELMAT 402(B)
CREDITS	5

On the completion of the course, students will be able to:

The objective of this course is to make students familiar with basic concepts of differential geometry so as to deal with geometry of curves and spaces using the methods of differential calculus. Understand the basic concepts and results related to space curves, tangents, normals and surfaces.
Explain the geometry of different types of curves and spaces. Explain the physical properties of different curves and spaces.

TITLE OF THE PAPER	MATHEMATICAL MODELING
PAPER CODE	PGELMAT 402(C)
CREDITS	5

On the completion of the course, students will be able to:

Create mathematical models of empirical or theoretical phenomena in domains such as the physical, natural, or social science.Create variables and other abstractions to solve college-level

mathematical problems in conjunction with previously-learned fundamental mathematical skills such as algebra. Draw inferences from models using college-level mathematical techniques including problem solving, quantitative reasoning, and exploration using multiple representations such as equations, tables, and graphs. Take an analytical approach to problems in their future endeavors

TITLE OF THE PAPER	NUMERICAL ANALYSIS AND FINITE DIFFERENCE METHOD
PAPER CODE	PGELMAT 403(A)
CREDITS	5

On the completion of the course, students will be able to:

This course is designed to provide a theoretical introduction and application of advanced numerical methods for solving different types of problems viz. linear systems, ordinary and partial differential equation arising in various field of applications, for example in science, engineering and economics etc. The major focus will be on development, analysis and implementation of numerical methods keeping in mind advantages & limitations of these methods. Identify the challenging problems in continuous mathematics (which are difficult to deal with analytically) and find their appropriate solutions accurately and efficiently.

Title of Paper	OPERATION RESEARCH - II
Course Code	PGELMAT 403(B)
Credits	5

After successful completion of this course, students should have developed a clear understanding of:

Solve linear programming problems using appropriate techniques and optimization solvers, interpret the results obtained and translate solutions into directives for action. Conduct and interpret post-optimal and sensitivity analysis and explain the primal-dual relationship. Develop mathematical skills to analyse and solve integer programming and network models arising from a wide range of applications. Effectively communicate ideas, explain procedures and interpret results and solutions in written and electronic forms to different audiences.

Title of Paper	ADVANCED NUMBER THEORY
Course Code	PGELMAT 403(C)

Credits 5

On successful completion, this course will enable the student to:

This course is designed to provide students an introduction to classical number theory and enable them to study higher courses in number theory, Apply the knowledge of Number theory attain a good mathematical maturity and enables to build mathematical thinking and skill. Identify the challenging problems in modern mathematics and find their appropriate solutions.

Title of Paper PROJECT WORK

Course Code PGPRMAT 404
Credits 5

This programme aims to develop an advanced training in mathematics with an emphasis on coursework. It offers opportunities to students of M.Sc. Mathematics to build and enhance their professional skills and qualifications in advanced mathematics in general and/or in some specialized areas of applied mathematics. The main objective of this course falls on the following aspects:

- To provide graduates with a comprehensive advanced knowledge of important areas of Mathematics.
- To produce graduates of high level of analytic and technical skills required for the program.
- To furnish them with the necessary background for further study in Mathematics and enhance their research capabilities.

ZOOLOGY

PROGRAM SPECIFIC OUTCOME OF M.Sc. ZOOLOGY

- Used the evidences of comparative biology to explain how the theory of evolution offers the only scientific explanation for the unity and diversity of life on earth. They are able to use specific examples to explicate how descent with modification has shaped animal morphology, physiology, life history, and behavior.
- Explicated the ecological interconnectedness of life on earth by tracing energy and nutrient flows through the environment. They are able to relate the physical features of the environment to the structure of populations, communities, and ecosystems.

- Subjects such as invasive or endangered species, embryonic development in mammals and ageing in social insects. Lead to advances in medicine to prevent disease amongst both animals and human beings.
- Developed knowledge and understood of living organisms at several levels of Zoological and Biological organization from the molecular, through to cells and whole organisms and ecosystems all organs of evolutionary perspectives. Understood how the chemistry and structure of the major biological macromolecules, including proteins and nucleic acids, determines their biological properties.

COURSE SPECIFIC OUTCOMES OF M.Sc. ZOOLOGY

ZOOCC101. Systematics, Evolution & Bioinformatics

- Students will learn basic concepts of taxonomy and systematics, different types of classification, nomenclature etc.
- By biological evolution we could understand that many of the organisms that inhabit the
- Earth today are different from those that inhabited it in the past
- Understood that the propositions underlying Darwin's theory of
- Explained adaptation, providing examples from several different fields of biology
- Explained how the molecular record provides evidence for evolution
- Understood the Human origin and evolution.
- Will understand the basic concepts of bioinformatics, which is an emerging and important aspect in life sciences.
- Students will learn about biological databases, data retrieval system, different sequence analysis software packages and tools.

ZOOCC102. Invertebrate diversity & quantitative biology

- Understood the Classification and Phylogeny of Animals
- Described General characteristics, classification of invertebrates and vertebrates.
- Described General characteristics, classification and systematic portion of Minor phyla
- Described the general biology of few selected non-chordates and chordates which are useful to mankind?
- Enriched knowledge on ecology of some important fishes, amphibians, reptiles, birds and mammals
- Came to know the data collection, tabulation and presentation.
- Described the mean, median, mode and SD.
- Understood the Analysis of Variance.
- Described Student ‘t’ test and probability
- Understood the Correlation and Regression.

ZOOCC103. Biotechniques, histology and histochemistry

- Students will learn about structure and functioning of analytical instruments, immune-cytochemistry.
- Students will learn about basics of histology and histochemistry.

ZOOCC104. Practical 1

- A practical hands on experience will be imparted to students on various analytical instruments like, pH meter, autoclave, centrifuge, colorimeter, spectrophotometer.
- They will learn different analytical techniques like TLC, Microtomy, different staining techniques, localization of different moieties.
- Student will learn the way to use Entrez to search information from databases.
- Perform different types of BLAST and generate report
- Perform homology modelling and generate report.

ZOOCC205. Cellular and molecular biology

- Described the ultra-structure and functions of cell organelles.
- Understood DNA replication, RNA and protein synthesis and came to know protein synthesis can be controlled at the level of transcription and translation.
- Understood cell signaling and cellular communication.
- Described the oncogenes
- Understood the types and applications of stem cells.

ZOOCC206. Vertebrate diversity, ethology and classical genetics

- Understood the Classification and Phylogeny of Animals
- Described General characteristics, classification of invertebrates and vertebrates.
- Described General characteristics, classification and systematic portion of Minor phyla
- Described the general biology of few selected non-chordates and chordates which are useful to mankind?
- Enriched knowledge on ecology of some important fishes, amphibians, reptiles, birds and mammals
- Described the fundamental molecular principles of genetics
- Understood the structure and function of DNA & RNA
- Understood about the transmission, distribution, arrangement, and alteration of genetic information and how it functions and is maintained in populations
- Described the basics of genetic mapping.
- Students will learn general concepts of ethology, orientation in animals, biological rhythms, imprinting etc.

ZOOCC207. Environmental and general vertebrate physiology

- An integrated Understanding of physiological mechanisms
- Described the physiology of digestive and respiratory system of human beings.
- Understood the blood composition, types, groups and circulatory system.

- Described the physiology of excretory system and nervous system of human beings.
- Came to know the physiology of sense organs, muscles and reproductive system.
- Students will gain elementary idea of stress and strain, thermoregulation, excretion and osmoregulation.

ZOOCC208. Practical 2

- Students will observe anatomically ARO in different fishes, cranial nerves in fishes.
- Will study different museum specimens.
- Perform different physiological experiments such as measurement of metabolic rate in small animals – effect of stress on gill ventilation in fish, determination of BP in humans etc.

ZOOCC309. Endocrinology & developmental biology

- Students will get concepts of comparative and molecular endocrinology.
- Understood and mastered on the basic concepts of developmental biology.
- Understood how fertilization, cleavage and gastrulating occur.
- Understood the basic concepts of organogenesis.
- Understood about the basic concepts of growth, regeneration and ageing
- Described the test tube baby and placentation in mammals.

ZOOCC310. Biochemistry & immunology

- Identified the five classes of polymeric biomolecules and their monomeric building blocks.
- Explained the specificity of enzymes (biochemical catalysts), and the chemistry involved in enzyme action.
- Understood types, Structure, biochemical properties and functions of vitamins.
- Explained how the metabolism of organic compounds leads ultimately to the generation of large quantities of ATP.
- Described the structure and classification of hormones.
- Mammalian reproductive physiology & biotechnology
- Outline the key components of the innate and adaptive immune responses.
- Described about cell types and organs which are involved in an immune response
- Described the Infectious diseases, hypersensitivity, autoimmune disorders, immunodeficiency diseases

ZOOCC311. Practical 3

- Practicals based on study of histochemical slides of endocrine glands.
- Students will perform and learn the importance of several analytical techniques such as quantitative estimation of cortisol in blood, hCG in blood etc.
- Will observe slides of different stages of development of frog and chick.
- Perform various practical of biochemistry and immunology to study and understand the concepts.

ZOOCC413. Special papers

A. Fish and fisheries I

   Students will gent Idea about the field of Fish and Fisheries, they will get and idea about aquaculture, ornamental fishes, freshwater and marine water fishes in india. And various physiological aspects of fishes are dealt with.

B. Entomology I

   Students will learn about the taxonomy and classification of insects.

   Will learn about the structure and life processes of insects, sense organs and perception, insect physiology, reproductive physiology of insects.

C. Ecology I

   Students will learn basic ecosystem concept, community ecology, population ecology, habitat ecology, biodiversity.

ZOOCC414. Special papers

A. Fish and fisheries II

   A paper with practical approach, students will learn about cultivable water, cultivable fish species, fish seed production and various fishing technologies.

B. Entomology II

   It is a paper based on practical applications of entomological concepts, students after going through this paper will learn about ecological management of crop environment. Will learn about insecticides' nomenclature, mode of actin of insecticides and toxicity to humans. Integrated pest management and other methods of insect pest management.

C. Ecology II

   Students will learn about basic concepts of pollution ecology.

ZOOCC415. Practical based on special papers

A. Fish and Fisheries: students will anatomically observe different systems of bony fishes, will learn different histological slides of various organs of fishes. Learn about fishing gears and ecological equipment.

B. Entomology: the students will study and learn the taxonomic descriptions and identification of different orders, study permanent slides of body parts, study histological slides.

C. Ecology: students will learn about analytical procedures used in ecology, water analysis, soil analysis, biotic analysis, biostatistical analysis, and adaptation studies.

ZOOCC416. Dissertation work

Students will prepare dissertation based on data originally produced by them or secondary data.

Geology

- For M. Sc. Course:
  - In paper PGGLGCC101 (Geotectonics and structural geology) the students get acquainted earth's structure, plate tectonics and its impacts, field geology and deformations taken place over the earth.
  - In paper PGGLGCC102 (Mineralogy, optical mineralogy and crystallography) the knowledge about descriptive and optical mineralogy and theory of crystal symmetry, its projection methods and the optical behavior of crystal is provided.
  - In paper PGGLGCC103 (Stratigraphy and palaeobiology) the knowledge of statrigraphic principles and code of nomenclature and major stratigraphic units of India, vertebrate, invertebrate and micropalaeontology is provided.
  - In paper PGGLGCC104 (Core course practical), the preparation and interpretation of map, crystallography and the physical and optical as of minerals are practised in laboratory.
  - In paper PGGLGCC205 (Geomorphology, remote sensing-GIS in geology) provides the knowledge about various features of the earth and role of natural agents in their formation, photogrammetry, remote sensing, digital images processing and GIS.
  - In paper PGGLGCC206 (Geochemistry and igneous petrology) deals with chemistry of the earth with every layer of the earth and behaviour of the elements, magma, igneous rocks, their classification, texture, structures and the feature developed during their cooling and the representative rock types.
  - .In paper PGGLGCC207 (Sedimentology and metamorphic petrology) the students learn about the processes of sedimentation, particle-fluid interaction, the texture, structure and classification, seismic and sequence stratigraphy, formation of metamorphic rocks, its relation to tectonism, representative rocks and chemographic diagrams.
  - In paper PGGLGCC208, laboratory work is done on drainage morphometry, megascopic and microscopic studies of rock, graphical representation of model and chemical analysis. Students go for geological mapping and industrial training of two weeks.
  - The paper PGGLGGE309 (A1, B1, C1) are discipline centric elective papers among these students has to choose one.
  - The paper PGGLGCC310 (Economic geology) provides the information about the modern concepts of ore genesis, processes of ore formation and its distribution in India.

- The paper PGGLGCC311 (Hydrology, environmental geology and mining geology) deals with the groundwater occurrence and quality, pollution control and mining methods.
- The paper PGGLGCC312 (Core coarse practical) in which knowledge of physical and optical properties of ores is provided, its distribution and plotting on outlined map of India and Jharkhand and geological section on hydrology is performed.
- The paper PGGLGGE413 (A2, B2, C2) are discipline centric elective papers among these students has to choose one.
- The paper PGGLGCC414 (Exploration and engineering geology) deals with mineral resources, its prospecting and exploration, sampling techniques, drilling and reserve estimation and planning and designing of dams, tunnels bridges and geological considerations to avoid accidents and natural calamities.
- The paper PGGLGGE415 (A, B, C) are discipline centric elective papers in which students have to perform laboratory work based on the topics of theory papers.
- The paper PGGLGCC416 (Project report and dissertation) in which the students have to prepare Project report and submit two copies of the dissertation work.

M.Sc. BOTANY

Programme Objective:

The most important objective of the programme M.Sc. Botany is to encourage and support the growing demands and challenging trends in the educational scenario. This aims to develop mastery in students about the branches and interaction of the plants with microorganisms and other components of environment. The objective is also to equip the students with the knowledge of evolution, development and importance of plants for human kind. To learn the Phylogeny of angiosperms and construction of phylogenetic trees. It helps learn about taxonomic families, Intellectual property rights and Progressive taxonomy.

Programme Specific Objective:

The objective of the course is to develop skills in students to be able to identify and name the plants. They could gain knowledge to identify and analyze scientific problems and environmental issues using oral and written communication skills. This will enable the students to develop scientific temperament after completion of the program. This will equip the students to do laboratory work from different equipments and they will be able to excel in the field related to scientific research in the area of Botany. This aims to prepare the students to excel in their career in botany by providing them with the knowledge of recent advanced trends in science, to build their career in lectureships and higher studies.

Course Objective:
CORE COURSE

CC01- To gain knowledge about general characteristics (asexual and sexual fruiting bodies), life cycle of the fungi and their different class. Their ecology, occurrence, classification and morphology. Different related diseases and pathogenic fungi, control measures and Host-Pathogen relationships. To gain knowledge of the microorganisms as cell factories also with advancement of recombinant DNA technology the recent research trends in science.

CC02- To learn about classification, features, origin and evolution of Bryophytes and Pteridophytes. The course helps understand the thallus organization, morphology, anatomy and reproduction of Hepaticopsida, Antherotopsida and Bryopsida.

CC03- To learn that biomolecules like carbohydrates, proteins and nucleic acids as key of cellular functions in plants. Their biosynthesis, properties and functions in an organism. The cell structure and subcellular components, structural and chemical composition of the cell. To gain knowledge about macromolecules and the mechanisms of gene replication. Also understanding how various cellular systems interact in terms of the way DNA, RNA and protein synthesis function. The different levels of regulation and maintenance of information in a cell.

CC04- Lab work of CC01, CC02 and CC03 that will help developing mastery in identification and morphological studies of different species of algae, fungi, bryophytes and pteridophytes. The students will be acquainted with knowledge of different laboratory techniques and microbial culture techniques.

CC04- To learn about unifying features of archegoniates- the primitive plants and their transition to land habit. The study of bryophytes, pteridophytes and gymnosperms; general characteristics, classification, early land plants; classification (up to family), morphology, anatomy and reproduction in these organisms.

CC05- To acquire knowledge on Gymnosperms focusing mainly on Pinaceae, Cupressaceae, Araucariaceae, Podocarpaceae, Cephalotaxaceae, Taxodiaceae, Taxales and Gnetales. It also aids learning about types and process of fossilization. The course also educates about Angiosperm taxonomy; identification, documentation and nomenclature, and study of the families: Ranunculaceae, Magnoliaceae, Portucalaceae, Apocynaceae, Lamiaceae, Verbenaceae, Euphorbiaceae, Liliaceae and Cyperaceae.

CC06- To acquire knowledge about plant diseases, various plant pathogens, and prevention and control of these diseases. It also helps to study plant anatomy in detail, talking about root and shoot, wood and floral and leaf anatomy. The course also educates about embryogenesis and reproductive developmental botany.

CC07- To gain knowledge about genetics and chromosomal inheritance in plants and biotechnological applications in the field of plant sciences.

CC08- Lab work of CC05, CC06 and CC07 that will help developing mastery in anatomical and morphological studies of different parts of plant, fossil studies and the laboratory techniques related to biotechnology and cytogenetics.

CC09- To gain in depth knowledge about pharmacognosy, specially secondary metabolites, quality control of crude drugs and nutraceuticals. It also helps acquire knowledge about ecology and environmental biology mainly about the population ecology, biogeographical ecology, applied ecology, the ecological disturbances, its anthropogenic causes and disaster management.
CC10 - To aid in learning about plant physiology, with reference to all the major plant metabolic activities like photosynthesis, respiration, growth and development. To equip the students with the knowledge of the biochemistry and enzymology in plants

CC11- To acquaint the students with the knowledge of methods in biology and recombinant DNA methods, biophysical, statistical methods, radiolabelling and microscopic techniques which play a major role in applied biology.

CC12- Lab work of CC09, CC10 and CC11 that will help in gaining hands on experience on different biochemistry and molecular biology techniques. Also in quantification and analysis of biomolecules, secondary metabolites and applied biology techniques.

CC13: DISSERTATION on the topic of interest after completion of above courses will help in developing better understanding of scientific problems and will clarify scientific approaches applied to solve the problem. To develop research oriented mindset of students.

SPECIAL PAPER
Special Paper: Applied Mycology And Molecular Plant Pathology

EC01: MYCOLOGY: To study about fungi in more detail, with respect to cell cycle, carbohydrate and energy metabolism, and signal transduction in fungi. It also aids in leaning about topics such as gene manipulation and heterologous gene expression in fungi. The students also learn about the applied portion of mycology, talking about role of fungi in techniques like fermentation and bioremediation.

EC02: EPIDEMIOLOGY, PHYSIOLOGY AND BIOCHEMISTRY OF DISEASED PLANTS
To acquire knowledge about epidemiology, physiology and biochemistry of diseased plants. It talks about the resistance mechanism in plants, signalling, and biological control in phytopathology. The molecular diagnosis of plant pathogens by different serological tests, antibodies etc. is discussed. Finally, it helps learn about disease management by quorum sensing and various transgenic approaches.

EC01.PR: Lab work of EC01 and EC02 (SPECIAL PAPER: APPLIED MYCOLOGY AND MOLECULAR PLANT PATHOLOGY)

Special Paper: Angiosperm Taxonomy

EC01: INTERDISCIPLINARY APPROACH OF TAXONOMY: To learn aboutTaxonomic Evidences in relation to Anatomy, Embryology and Palynology and their examples in solving taxonomic problems. It also helps educate about Chemotaxonomy mainly relating to primary and secondary metabolites in plants and Molecular taxonomy giving emphasis on Karyotyping and DNA fingerprinting.

EC02: NUMERICAL TAXONOMY, PROGRESSIVE TAXONOMY AND PHYLOGENY OF ANGIOSPERMS : To gain knowledge about taxonomic keys and green belt, numerical taxonomy mainly about cluster analysis, phylogeny of angiosperms and construction of phylogenetic trees. It helps learn about taxonomic families, Intellectual property rights and Progressive taxonomy.

EC01.PR: Lab work of EC01 and EC02 (SPECIAL PAPER: ANGIOSPERM TAXONOMY)

Programme Outcomes (Professional)

Bachelor of Business Administration (BBA)

- *Enable students to apply knowledge of management theories and practices to solve business problems.*
- *Encourage analytical and critical thinking abilities for business decision making.*
- *Enable students to effectively communicate business issues, management concepts, plans and decisions both in oral and written form using appropriate supportive technologies.*
- *Equip students to demonstrate capabilities required to apply cross-functional business knowledge and technologies in solving real-world business problems.*
- *Acquire a solid foundation to pursue professional careers and take up higher learning programmes for career development*
- *Help to Initiate and build upon entrepreneurial ventures*
- *Make students capable of recognizing and resolving ethical issues*

Bachelor of Business Administration (BBA)

Programme Outcome

- **PO1**: Enables students to apply knowledge of management theories and practices to solve business problems.
- **PO 2:** Encourages analytical and critical thinking abilities for business decision making.

- **PO 3:** Enables students to effectively communicate business issues, management concepts, plans and decisions both in oral and written form using appropriate supportive technologies.
- **PO 4:** Equips students to demonstrate the capabilities required to apply cross-functional business knowledge and technologies in solving real-world business problems.
- **PO 5:** Acquire a solid foundation to pursue professional careers and take up higher learning courses
- **PO 6:** Helps to Initiate and build upon entrepreneurial ventures
- **PO 7:** Makes students capable of recognizing and resolving ethical issues

- **Programme Specific Outcome**
- **PSO 1:** Ability todevelop competencies of the students in the chosen field of marketing, finance and human resource management and apply the learning to the primary, secondary and the tertiary commercial sectors.
- **PSO 2:** Ability to define, analyze the solutions for different business problems and using logical reasoning patterns for evaluating information, materials, and data for practical implementation.
- **PSO 3:** Learn how to effectively use verbal, reasoning, Data Interpretation, Quantitative and communication skill to solve specific business problems and decision making.
- **PSO 4:** Apply ethical principles and commitment towards professional ethics and responsibility.
- **PSO 5:** Function effectively as a member, leader, and build strong relationships with all the stakeholders in diverse environment.
- **PSO 6:** Ability to conceptualize a complex issue into a coherent written statement and oral presentation and to communicate effectively on complex activities with technical community.
- **PSO 7:** Promotes entrepreneurship by providing understanding of the fundamentals of creating and managing innovation, new business development, and high-growth potential entities.

- **Course Outcome of Bachelor of Business Administration**

SEMESTER -I

- **Course Title: Principles and Practices of Management**
- **Course Code: BBA/C/101**
- **CO 1:** Understand the concepts of managerial practise and perspectives.
- **CO 2:** Execute managerial tasks in a variety of circumstances
- **CO 3**: Apply the concepts learned in the course towards the management of one's own entrepreneurial venture.

- **Course Title: Business Statistics**
- **Course Code: BBA/C/102**
- **CO 1:** Gaining knowledge of basic concepts/fundamentals of business statistics.
- **CO 2:** Demonstrate the calculation and assimilation of data via the use of different statistical tools
- **CO 3:** Study charts, graphs to analyze business situations
- **CO 4:** Helps in making more impactful predictions based on patterns in data, like assessing financial risks, marketing surveys etc.
- **Course Title: Ethics and Corporate Social Responsibility**
- **Course Code: BBA/GE/101**
- **CO 1:** Understanding significance of ethics and ethical practices in businesses
- **CO 2:** Learning and exhibiting the applicability of ethics in functional areas like marketing, finance and human resource management
- **CO 3:** Understanding the emerging need and growing importance of good governance and CSR by organizations.

- **SEMESTER -II**

- **Course Title: Business Communication**
- **Course Code: BBA/AECC/202**
- **CO 1:** Introduction the various elements of Business communication and consider their roles in managing organizations.
- **CO 2:** Become familiar with different types and channels of communication and its usage in an organization
- **CO 3:** Examining how various elements of business communication must be coordinated
- **CO 4:** Have an understanding of the basic format and style in business correspondence to carry out organizational activities

- **Course Title: Human Resource Management**
- **Course Code: BBA/C/203**
- **CO 1:** Understanding the concept and growing importance of HRM in organizations
- **CO 2:** Applying the techniques of HRM process in an organization
- **CO 3:** Demonstrate a basic understanding of different tools used in forecasting and planning HR needs.
- **CO 4:** Ability to recruit Select and interview job candidates
- **CO 5:** To understand job-based compensation scheme and performance management system and appraisals.

- **Course Title: Organizational Behaviour**
- **Course Code: BBA/C/204**
- **CO 1:** Students understand the behavior of people in the organization and its impact upon organizational processes
- **CO 2:** Demonstrate the applicability of the complexities associated with management of individual behavior in the organization.
- **CO 3:**Analyze the complexities associated with management of the group behavior in the organization

- **CO 4:** Examine and apply the concepts Leadership Style at place of work
- **CO 5:** Demonstrate how the organizational behavior can integrate in understanding the motivation (why) behind behavior of people in the organization
- **CO 6:** Have a perspective of diverse cultural environment

- **Course Title: Entrepreneurship Development**
- **Course Code: BBA/GE/202**
- **CO 1:** Understand theories of entrepreneurship and business development
- **CO 2:** Understand and describe business opportunities and an indepth understanding of Entrepreneurship
- **CO 3:** Design new plan, organize and execute a project report for new venture
- **CO 4:** Identify the government policies and incentives to the small enterprises

- **SEMESTER -III**

- **Course Title: Managerial Economics**
- **Course Code: BBA/C/305**
- **CO 1:** Understand the micro economic concepts
- **CO 2:** Students would be able to apply economic analysis in the formulation of business policies
- **CO 3:** They get familiarized with the importance of economic approaches in managerial decision making
- **CO 4:** Understand and implement the applications of economic theories in business decisions
- **CO 5**: To use economic reasoning to problems of business.

- **Course Title: Principles of Marketing**
- **Course Code: BBA/C/306**
- **CO 1:** Have a basic knowledge and understand the concepts of marketing
- **CO 2:** Identify the techniques and the concepts that practicing marketers use to develop products and successful marketing campaigns
- **CO 3:** They will look closely at what constitutes a market and how a marketer identifies, segments and targets markets
- **CO 4:** They will be introduced to the ways in which marketers develop the elements of the marketing mix

- **Course Title: Cost & Management Accounting**
- **Course Code: BBA/C/307**
- **CO 1:** Understand the role of a corporate manager in applying the concept of cost for varying purpose of cost control and cost reduction to achieve the leadership role of any company in the field of cost management.
- **CO 2:** Students should be able to determine product costs, formulate budgets and standards for planning and control, understand the role of responsibility accounting and performance measurement
- **CO 3:** Explain contemporary thinking in management accounting

- **Course Title: Productions and Operations Management**
- **Course Code: BBA/GE/303**
- **CO 1:** Understand the concepts of Production planning and management/ Operations management and its application to industrial problems
- **CO 2:** Assists in analysis with the selection of the plant location, layout, selection of process,

  CO 3: Controlling production process and producing quality products

- **Course Title: IT Tools for Business**
- **Course Code: BBA/SEC/301**
- **CO 1:** A fundamental understanding of information systems concepts and their role in contemporary business and also allow Participation in information systems development as an informed person.

- **SEMESTER IV**

- **Course Title: Business and Marketing Research**
- **Course Code: BBA/C/408**
- **CO 1:** Have an understanding of various kinds of research, objectives of doing research, research process research designs and sampling.
- **CO 2:** Be able to formulate research problem, develop a research design and methods of data collection
- **CO 3:** Have basic knowledge on qualitative, quantitative as well as measurement & scaling techniques.
- **CO 4:** Have a basic awareness of data analysis, including descriptive & inferential measures

- **Course Title: Macroeconomics**
- **Course Code: BBA/C/409**
- **CO 1:** Students get an understanding of income, output, and expenditure, the purpose of National Accounts, and the conceptual and practical issues involved in measuring economic activity
- **CO 2:** They will be able to understand the behaviour and working of the economy as a whole, understand the relationships among broad aggregates, apply economic reasoning to problems of business and public policy

- **Course Title: Financial Management**
- **Course Code: BBA/C/410**
- **CO 1:** Helps to understand the basic concepts of Financial Management in decision making related to business
- **CO 2:** Demonstrate the understanding of time value of money and various managerial decisions such as financial, investment and dividend decisions and importance of working capital management.

- **Course Title: Tax Planning**
- **Course Code: BBA/GE/404**
- **CO 1:** Students will get working knowledge regarding legitimate way of tax planning under different financial/ managerial decisions after taking into consideration the impact of Direct Tax Laws.
- **CO 2:** Understand the concept of GST

- **Course Title: E- Commerce**
- **Course Code: BBA/SEC /402**
- **CO 1:** Understand the concept of electronic commerce
- **CO 2:** Be able to state and understand how electronic commerce is affecting business enterprises, governments, consumers, and people in general.

- **SEMESTER V**

- **Course Title: Quantitative Techniques for Management**
- **Course Code: BBA/C/511**
- **CO 1**: Understand various quantitative & statistical methods
- **CO 2:** Critically review the collection, presentation, analysis of data, and draw inference from data

- **CO 3:** Discuss the results of the application of statistical techniques to data in written reports and oral presentation.

- **Course Title: Legal Aspects of Business**
- **Course Code: BBA/C/512**
- **CO1:** demonstrate an understanding of the legal environment of business in India
- **CO 2:** Apply basic legal knowledge to business transactions
- **O3:** Reflect the basic understanding of the laws relating to contract, negotiable instruments, consumer protection, competition and dispute resolution
- **CO 4:** Enumerate the types of companies its management and its rules of corporate governance

- **Course Title**: **Investment Analysis and Portfolio Management**
- **Course Code: BBA/DSE/501** (FINANCE)
- **CO 1:** Have an adequate knowledge to trade- off risk and return for managing investment to achieve optimal return
- **CO 2:** Take investment decisions for optimal utilisation of funds through different investment channels following modern portfolio management concept.

- **Course Title: Advertising & Brand Management**
- **Course Code: BBA/DSE/501** (MARKETING)
- **CO 1:** Get a good view of various practical and applicable aspects of advertising and brand management that includes understanding different types of markets, competition, buyer behavior and brand building.
- **CO 2:** Have a sound understanding of Brand Management function in the emerging context, the skills in Building and Managing Brands over time, and synthesizing a framework for a Branding Strategy

- **Course Title: Management of Industrial Relationship**
- **Course Code: BBA/DSE/501** (HRM)
- **CO 1:** Students should able to elaborate the concept of Industrial Relations.
- **CO 2:** Outline the important causes & impact of industrial disputes, and industrial dispute settlement procedures
- **CO 3:** Be acquainted with the concepts, principles and issues connected with trade unions, collective bargaining, workers participation, grievance redressal, and employee discipline and dispute resolution.
- **CO 4:** To acquire skills in handling employer-employee relations.

- **Course Title: Research Project**
- **Course Code: BBA/DSE/502**
- **CO 1:** Demonstrate the application of knowledge and skill sets acquired from the course and workplace in the assigned job functions
- **CO 2:** Solve real life challenges in the workplace by analyzing work environment and conditions, and selecting appropriate skill sets acquired from the course
- **CO 3:** Exhibit problem solving skills by analyzing underlying issue/s to challenges
- **CO 4:**Student will explore career options and gain general work experience

- **SEMESTER VI**

- **Course Title: Business Policy and Strategic Management**
- **Course Code: BBA/DSE/613**
- **CO 1:** Students will be able to describe major theories, background work, concepts and research output in the field of strategic management
- **CO 2:** demonstrate a clear understanding of the concepts, tools & techniques used by executives in developing and executing strategies and will appreciate its integrative and interdisciplinary nature

- **CO 3:** Reflect an understanding of effective application of concepts, tools & techniques to practical situations for diagnosing and solving organizational problems
- **CO 4:** Develop and prepare organizational strategies that will be effective for the current business environment
- **CO 5:**To develop student powers of managerial judgment, help them learn how to assess business risk, and improve their ability to make sound business decisions and achieve effective outcomes.

- **Course Title: Financial Institutions and Markets**
- **Course Code: BBA/DSE/614**
- **CO 1:** Students get familiarized with recent trends in financial services and its operations
- **CO 2:** They get a conceptual framework of Financial Markets and its Regulatory Authority
- **CO 3:** Get them familiarized about Regulatory authorities and Monetary Policy Tools used by them to balance the economy.

- **Course Title: Investment Banking & Financial Services**
- **Course Code: BBA/DSE/603** (FINANCE)
- **CO 1:** Understand the different aspects of Investment banking, mergers and acquisition and the detailed SEBI guidelines on issue management.

- **Course Title: Consumer Behaviour**
- **Course Code: BBA/DSE/603** (MARKETING)
- **CO 1:** Students understand the motivations and behaviours influencing customers, which is an essential prerequisite to the development of effective Marketing and Corporate strategy.
- **CO 2:** Demonstrate the understanding of the internal, external and situational influences driving the what, where, when, why and how of Consumer Behaviour.

- **Course Title: Training & Development**
- **Course Code: BBA/DSE/603** (HRM)
- **CO 1:**To develop an understanding of the evolution of training & development from a tactical to a strategic function
- **CO 2:** Explain how to design, conduct, and evaluate employee training
- **CO 3:** Identify techniques to develop employees and implement Management Development Techniques
- **CO 4:** To evaluate the effectiveness of training and development programmes as well as learning outcomes.

- **Course Title: Project Appraisal**
- **Course Code: BBA/DSE 604** (FINANCE)
- **CO 1:** Will be able to apply the principles and practices while maintain standards of practice, making ethical judgements and decisions
- **CO 2:** Understand and identify project characteristics and various stages of a project
- **CO 3:**Analyze and demonstrate the learning and understand techniques for Project planning, scheduling and Execution Control.
- **CO 4:** Identify key risk factors and risk management and analyse the role of stakeholders

- **Course Title: International Marketing**
- **Course Code: BBA/DSE/604** (MARKETING)
- **CO 1:** Have a knowledge about the international marketing theory and concepts and understand the global marketing environment and its application in an in- depth industry;
- **CO 2:** Develop understanding of international business and also get an insight on strategies related to entry and administration in international environment.

- **Course Title: HRD: Systems and Strategies**
- **Course Code: BBA/DSE/604** (HRM)
- **CO 1:**Explain human resources development (HRD) and its theories, the difference between training, learning and the concept of the transfer of learning
- **CO 2:** Demonstrate the understanding of the wide range of approaches and interventions which comprise HRD
- **CO 3:** Understand the integration of HRD with other areas of HRM and overall business strategy
- **CO 4:** To emulate the skills of developing a detailed plan for need and implementation of HRD program in the organization

Bachelor of Education (PBED)

- *To empower students with pedagogical skills and competencies*
- *To make students aware of contemporary issues of regional, national and international concerns*
- *To render unselfish services as per demands of the community*
- *To inculcate social, moral and cultural values in the students*
- *To promote feelings of nationalism and universal brotherhood*
- *To provide equal opportunities to all genders*
- *To spread awareness regarding environmental issues*
- *To develop problem solving ability in students*
- *To contribute in the educational development of Jharkhand*

Department of Education

Bachelor of Education (PBED)

Program Outcomes (PO)

Program specific Outcomes(PSO)

Course Outcomes(CO)

Mission

B. Ed. Programme aims to prepare committed teachers for the state of Jharkhand and the country. It strives to empower the students with professional competencies and maintains high academic standards in a friendly atmosphere. It tries to instill high caliber and integrity among the future teachers and promote all round development. In keeping pace with the contemporary advancements, the programme encourages use of ICT in the transactional processes. It focuses in sensitizing its trainee teachers for sustainable development by generating awareness regarding various environmental issues. Various experiences imparted orient them for creation of an inclusive society. Research and extension activities are promoted for addressing different issues related to pedagogy.

Vision

Since its inception in 2005, the vision of the programme has remained to

- Build an egalitarian society based on justice, freedom and harmony by inculcating appropriate values in our trainee teachers through a comprehensive curriculum.
- Train well motivated teachers, who will be intellectually competent, morally upright, socially committed and spiritually inspired in order to become instrumental in social transformation.
- Preserve and promote academic and cultural heritage of the region as well as nation.
- Set a high standard for the students in every field.
- Motivate trainee teachers to strive continuously to enrich their personality by the life-long process of learning.
- Make them competent and optimistic professionals by instilling required values and skills.

Programme objectives

Po1) To develop Chotanagpur region educationally.

Po2) To empower students with pedagogical skills and competencies.

Po3) To make students aware of contemporary issues of regional, national and international concerns.

Po4) To render unselfish services as per demand of the community.

Po5) To inculcate social, moral and cultural values in the students.

Po6) To promote feelings of nationalism and universal brotherhood.

Po7) To provide equal opportunities to both the genders.

Po8) To spread awareness regarding environmental issues.

Po9) To Develop problem solving ability in students.

PSO of B.Ed.

Pso1) Understand the importance of education for national change and social change.

Pso2) Aquaintwith needs of learner and learning environment.

Pso3) Learn various approaches of classroom and school management.

Pso4) Apply various teaching approaches and strategies in classroom situations.

Pso5) Understand the nature of assessment and evaluation and its importance in teaching learning process.

Pso6) Learn the principles of curriculum construction.

Pso7) Sensitize towards needs of special children and understand importance of inclusion.

Pso8) Enhance professional competencies.

Pso9) Develop insight to teach different pedagogical subjects.

Pso10) Understand the significance of fine arts and performing arts at school level education.

COS Course outcomes

Paper –I Education for national development and social change(BED C 101)

Co1) Describe aims of education.

Co2) Discuss the impact of caste, religion, language and region on education.

Co3) State role of education in bringing social change.

Co4) Discuss contribution of various educational thoughts and thinkers.

Co5) Analyse scenario of education in pre and post independent India.

Paper-II Learner and Learning(BED C 102)

Co1) Illustrate the importance of educational psychology for teacher and learner.

Co2) State principles of growth and development.

Co3) Explain individual difference in learners.

Co4) Describe different theories of learning.

Co5) Discuss role of motivation in learning.

C06) Illustrate the role of mental health in personality development.

EPC-I Language across curriculum(BED C 103)

Co1) Illustrate nature and function of language.

Co2) Describe activities which promote language proficiency.

Co3) Explain importance of communication and list its barriers.

Co4) Throw light on role of multimedia in communication.

EPC-II Art and Aesthetics(BED C 104)

Co1) Write aims and objectives of Art.

Co2) Briefly describe about performing Art.

Co3) Classify fine art and state its importance

EPC-III Health And Physical Education(BED C 105)

Co1) Describe importance of health education.

Co2) Define balanced diet and write about nutritional deficiencies.

Co3) Discuss causes of life style diseases.

Co4) Throw light on importance of Yoga, games and sports in our life.

SEMESTER – II

Paper –III Classroom Organization and School Management(BEDC 206)

Co1) Explain different components of school management.

Co2)Describe the factors playing important role in classroom management.

Co3)Throw light on functions of various educational bodies.

Co4) Discuss role of educational leadership in the school.

Co5) Write about essential physical facilities in a school.

Paper IV (A) Pedagogy of Subjects(BEDC 206)(B)Pedagogy of Subjects(BEDC311M1) (BEDC311M2)

Teaching of Science Physical Science /Biological Science (BEDC207M1/BEDC207M2)

Co1)Student teachers will able to gain insight into the meaning, nature, scope and objectives of science education.

Co2)Student teachers will be able to understand the aims and objectives of science teaching.

Co3) Will be able to apply different teaching approaches and strategies in the classroom.

Co4) Will be able to use different assessment procedures in the classroom.

Co5) Student teachers will be able to develop favorable attitude of students towards science.

Mathematics (BEDC207M1/BEDC207M2)

Co1) Student teachers will be able to understand the nature and objectives of mathematics as a discipline.

Co2) Student teachers will be able to plan and execute various teaching strategies approaches of Mathematics teaching in the classroom.

Co3) Will be able to teach Mathematics in the interesting manner.

Co4) Will be able to apply different assessment procedures in the classroom.

Co5) Will be able to organize various experiences (for the students) in the classroom and Mathematics laboratory.

History (BEDC207M1/BEDC207M2)

Co1) Student teachers will be able to understand the nature and importance of History teaching subject.

Co2) Will be able to teach the subject effectively in the classroom.

Co3) Will be able to create interest among the students for the subject.

Co4) Will be able to apply various teaching strategies in the classroom.

Co4)Will be able to use different assessment tools and technique in the classroom.

Civics (BEDC207M1/BEDC207M2)

Co1) Will be able to understand the nature, importance and scope of civics.

Co2) Will be able to understand the aims and objectives of civics teaching.

Co3) Will be able to teach the subjects effectively by using various leaner centric approaches.

Co3) Will be able to inculcate various attributes among the students required to be good citizens.

Co4) Will be able to apply various assessment procedures to assess different domains of personality.

Geography (BEDC207M1/BEDC207M2)

Co1) Student teachers will be able to understand the nature of knowledge in Geography.

Co2) Will be able to trace different trends in learning of the subject and will be able to apply teaching methods accordingly.

Co3) Will be able to use relevant learning resources for transaction of knowledge.

Co4) Will be able to analyze the curriculum of Geography and give their inputs after reflection.

Co5) Will be able to perform and demonstrate different practical in geography laboratory.

English (BEDC207M1/BEDC207M2)

Co1) Student teacher will be able to understand the nature and characteristics of English language.

Co2) Will be able to develop the perspective on English language education in Indian context.

Co3) Will be able to apply various teaching methods for effective learning.

Co4) Will be able to formulate and use various learning resources in the classroom.

Co5) Will be able to assess and locate gaps in the learning of language.

Economics (BEDC207M1/BEDC207M2)

Co1) Will be able to understand the meaning, nature and scope of economics.

Co2) Will be able to acquire the knowledge about correlation of economics with different subjects.

Co3) Will be able to develop ability to use different teaching approaches for transaction of knowledge.

Co5) Will be able to provide varied experiences to the students concerning subject.

Co6) Will be able to analyze the content and curriculum of the subject.

हिन्दी शिक्षण (BEDC207M1/BEDC207M2)

1) प्रशिक्षु हिन्दी शिक्षण के लक्ष्यों एवं उद्देश्यों को समझ सकेंगे।

2) प्रशिक्षु भाषा सीखने की प्रक्रिया के बारे में ज्ञान अर्जित कर सकेंगे।

3) प्रशिक्षु विभिन्न बोर्ड के हिन्दी पाठ्यक्रम का विश्लेषण कर सकेंगे।

4) प्रशिक्षु हिन्दी शिक्षण की विविध विधियों का कक्षा में प्रभावशाली प्रयोग कर सकेंगे।

5) प्रशिक्षु प्रभावशाली संप्रेषण के लिए आवश्यक कौशल विकसित कर सकेंगे।

Commerce(BEDC311M1)(BEDC311M2)

Co1) To instill in the would be commerce teachers deeper understanding of commerce education.

Co2)Students will be familiar with curriculum, text books and co-curricular activities in commerce.

Co3)Students will be able to prepare lesson plan, unit plan, blue print etc.

Co4)Students will be enabled to describing pedagogic needs of a subject and accommodation of the methodology for effective teaching.

EPC-IV ICT(BEDC 208)

Co1) Write the History and evolution of computer system.

Co2) Describe computer hardware and its types.

Co3) Prepare a resume in Ms Word.

Co4) Edit/correct the given text in Ms Word.

Co5) Download material from internet of your subject.

Co6) Discuss operating system and its types.

Co7) Prepare Ms Excel sheet of the given data.

Co8) Prepare a Ms Power Point presentation from any topic of your subject.

SEMESTER - III

Παπερ □ ς Τεαχηινγ Αππροαχηεσ & Στρατεγιεσ(ΒΕΔΧ310)

Co1) Describe maxims of teaching and factors affecting it.

Co2) Explain different phases of teaching.

Co3) Discuss importance of microteaching and different approaches of teaching.

Co4) Describe various approaches of individualized learning.

Co5) Discuss importance of professional development programmes for teacher.

Paper IV (B)Pedagogy of Subjects(BEDC311M1) (BEDC311M2)

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Co6) Will be able to analyze the content and curriculum of the subject.

हिन्दी शिक्षण (BEDC207M1/BEDC207M2)

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2) प्रशिक्षु भाषा सीखने की प्रक्रिया के बारे में ज्ञान अर्जित कर सकेंगे।

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4) प्रशिक्षु हिन्दी शिक्षण की विविध विधियों का कक्षा में प्रभावशाली प्रयोग कर सकेंगे।

5) प्रशिक्षु प्रभावशाली संप्रेषण के लिए आवश्यक कौशल विकसित कर सकेंगे।

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Co4)Students will be enabled to describing pedagogic needs of a subject and accommodation of the methodology for effective teaching.

SEMESTER – IV

Paper –VI Ασ□ □ ☒μεντ ανδ Εϖαλυατιον(ΒΕΔΧ413)

Co1) Explain characteristics and purpose of evaluation.

Co2) Discuss styles of writing instructional objectives.

Co3) Describe characteristics of standardized tests.

Co4) Write about major tools of evaluation and their uses.

Co5) Discuss characteristics of a good test.

Co6) Apply elementary statistical in educational evaluation.

Paper –VII Knowledge And Curriculum(BEDC414)

Co1) Describe different approaches of knowledge transaction.

Co2) Discuss components and types of curriculum.

Co3) Write principles of curriculum construction.

Co4) Throw light on curriculum reforms.

Co5) Analyse different curriculum.

Paper – VIII Creating and inclusive School(BEDC415)

Co1) Explain factors affecting special education.

Co2) Classify children with special needs based on their characteristics.

Co3) Write about various national policies and international conventions for inclusive educations.

Co4) Describe various models of inclusive education.

Co5) Discuss role of parents, community, peers and teachers in inclusion.

EPC- V Art And Aesthetics(BEDC416)

Co1) Illustrate application of arts in academics.

Co2) Write about decorative arts

Co3) Describe uses of various musical instruments and contribution of artists playing them.

Co4) Identify folk instruments and regional performing art forms of India.